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A RECORD & REVIEW *of* CURRENT THOUGHT AND ACTION

VOLUME TWENTY-TWO | *May, 1903* | NUMBER FIVE

A FEAT IN ENGINEERING SKILL

THE BIGGEST UNDERGROUND RAILWAY SCHEME IN THE WORLD NOW IN PROGRESS IN PARIS

NEW YORK, London and Paris, the three great cities in which center the wealth and energy of the world, are all becoming more and more familiar with vast tunnel systems for rapid transit. Strange as it may seem, the higher development of underground travel has been reached within the past two or three years. In New York the underground or subway system is not yet in working order. In London Mr. Yerkes has been successful in giving rapid electric transit which has won popular approval, and as is generally known, the city is burrowed under in all directions. The tunnels are not, however, arranged under one comprehensive plan. It is in this respect that Paris has the biggest underground scheme in the world now in progress. The French engineers estimate that it will require four more years to finish the plans in their entirety. Paris will then possess nearly fifty miles of new railway lines—49½ miles to be precise—almost exclusively underground.

Roughly speaking, the scheme may be described as comprising a circular line. This circle is cut and intersected by a great number of transverse lines terminating at some distance without its circumference on the extreme boundaries of the city and crossing the Seine either by means of tunnels or bridges at no fewer than six different points. There will be eventually 133 stations, situated at seldom more than 500 or 600 yards distance from one another. Such an arrangement, it is clear, places every part of the city within easy reach of the line.

As the scheme has been elaborated by one central authority for the good of the whole community, and not primarily for the benefit of any set of private individuals, every one of the 133 stations is in direct communication with every other station on the system. It will suffice, therefore, to enter a train at any station to reach any other by simply changing carriages at the proper point of intersection or junction, the fare being uniform whatever the distance. At certain of these junctions—as, for instance, at the Trocadero, the Arc de Triomphe, and the Opera—three lines meet, and in such cases the station is in two or three tiers if necessary, each level being connected by staircases with the others. At one or two points where the street dips more than usual the line instead of following the contour of the street above it forsakes its subterranean bed and emerges into the light of day. It thus temporarily changes its character of underground railway and becomes instead an overhead line, passing across the intervening depression on light stone viaducts erected in the middle of the thoroughfare.

Excavations were begun in November, 1898, and less than two years later, in September, 1900, the first section—the line traversing Paris from east to west—6½ miles in length, was in full working order. This line starts from Porte Maillot on the extreme west of Paris, turns under the Arc de Triomphe, and so on to the Champs Elysees, passes under the Place de la Concorde and the entire length of the Rue de Rivoli, and terminates at the Porte de Vincennes on the extreme eastern side of

How the ground underneath the Paris Opera House will be pierced by three tunnels, which cross one another and form one of the principal junctions of the Metropolitan Railway.

As has been stated above the fare is uniform whatever the distance, five cents, but instead of there being one class only, as in American cities, there are two—first and second. The first-class fare is five cents, the second-class three cents—not exorbitant for being transported rapidly half a score of miles. Before nine o'clock in the morning, too, return second-class tickets, available to return at any time of the day, are issued for the modest sum of four cents.

Paris. A few months ago the northern half of the circular line was opened to traffic, and there are now in all twenty-eight miles of line in daily use, comprising forty-three stations.

The popularity of the new railway was evident from the very first day. The wonder principally was how people possibly managed previously. Figures, however, have far greater eloquence than mere assertion in such a case. During the twenty-eight days of last February 8,165,652 pas-

sengers, not far short of four times the entire population of Paris, made use of the line, the gross receipts being $280,000. During the same period the trains ran a total distance of 214,614 miles.

To a non-technical eye the Paris railway appears to be light in construction. It is not anything like the same depth below the level of the streets as the Tube, and the platforms are generally reached by two short flights of steps. No separate, heavy engines are employed, the necessary motor apparatus being packed into a small compartment at the head of the leading carriage of each train. Though the line passes under some of the most fashionable thoroughfares in Paris very few complaints have been heard about any unpleasant vibrations. Humanity would not be humanity, however, if it had not something to grumble at, so in Paris they have discovered that the air in the railway is vitiated. It certainly is less pure than the air at the summit of Mont Blanc, but there is nothing in it to grievously offend any well-seasoned city nostrils. As a matter of fact, however, the railway is excessively popular already with the honest sons of toil, who naturally select the most economical class available to them. Fastidious persons who object to being shut up in a close atmosphere on a warm day with thirty or forty corduroy-clad men should therefore indulge themselves in the luxury of a first-class ticket, for candor compels me to admit that in the first-class carriages the air is perceptibly better.

The railway is being constructed by one of those ingenious financial combinations at which the French are such adepts. The total cost of the tunnels and stations and other incidental expenditure is estimated at $67,500,000. For this sum the Conseil Municipal—the Paris County Council—has issued loans, the interest on which is guaranteed by the receipts of the future railway. Though constructed by the council, however, the line is not worked by them but by a private company to which it has been farmed for a period of thirty-five years. Whenever a section—tunnel and station platforms—is completed it is handed over to this company, who have to furnish it with rails and rolling stock and build the communications between the streets and the stations. The agreement between the town and the company provides for a proper service of trains and fixes the fares chargeable. In return for its privilege the company has to pay the council one cent on every second-class ticket and two cents on every first-class ticket it issues. The results already obtained seem to indicate that the arrangement will prove most remunerative both for the council and the company. As for the public it is enchanted.

A point of considerable interest in connection with the railway to students of the social problem is the intervention of the state in regulating the price of labor and the relation of employers and employed. The line is constructed by private contractors under the direct supervision of the well-known engineer, M. Bienvenue, acting on behalf of the council. About 4,500 workmen are regularly employed by the contractors, who are bound under heavy penalties to pay certain fixed rates of wages.

The interests of the employes of the company which exploits the line are similarly protected and a number of very important privileges secured to them. Should an employe be too ill for any reason to attend to his duties he can claim full pay during at least a year.

WONDERS OF THE AUTOMATIC TELEPHONE

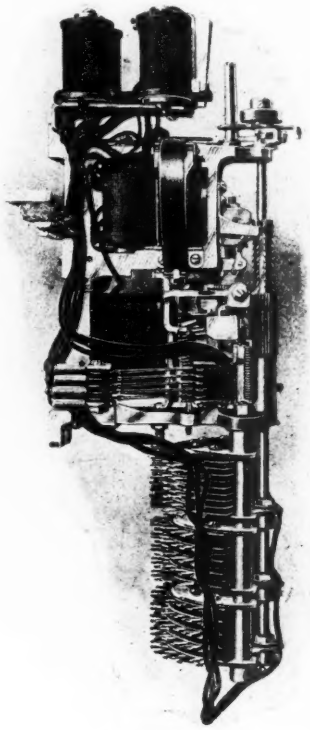
THE TELEPHONE

THE days of the telephone girl are numbered. A system of automatic telephones has been invented and put in successful operation in a number of cities, whereby it is possible for one at his desk to make his own connections and talk with perfect freedom and without the annoyance of constant interruptions. Writing of a visit to the largest automatic telephone exchange on Fifth Avenue, Chicago, Annie B. McClure, in The Oaks, says:

"I walked up to an ornamental telephone box and the superintendent indicating the dial below the mouthpiece told me to call any number I might wish to. I chose '981.' I placed my finger on the dial, selecting the number 9, then 8, and then 1, and successively moved the sliding part of the dial to them. My receiver was already clear of its hook. I placed it to my ear and found that I had secured my number and was ready to talk with the 'man at the other end of the line.' I had no 'Hello' to give to a central operator, no waiting her convenience or physical capacity to serve me.

"When I rang '9' I had connected my telephone with a trunk line in the main exchange leading to a group of switches. A 'selector' operated wholly by electricity had done its work with a 'connector' and an electrical union had been made with the series of switches in which the 900's rested. The ringing of the '8' selected the eighth group of tens in this hundred, and the last ring '1' finally connected me with the first switch in this group. This connection supplemented by the mere touching of a button had rung for me in the office of the person I desired a bell, and my telephone service was ready. I had accomplished this through a telephone exchange in which ten thousand subscribers could be served at the same time—not simultaneously, but so closely together that delay and confusion were certain to be impossible.

"Had my line been busy when I called my particular number I would have received an automatic 'buzzer' notice and if my line had been grounded or short-circuited or otherwise out of order the notice would have been automatically transmitted to the exchange itself through the medium of electric bells and lamps.



THE SELECTOR

"The automatic telephone is a new thing to the general public, although it is in use in Berlin and Washington. It is not an invention that from a financial point of view needs exploiting, because it has corporate wealth and power behind it. I could not say anything that would help or injure it. But as a purely original invention finding its first great public service in this opening of the new century it is one of the most remarkable things ever brought out to supplant a bothersome, annoying and expensive old system—the Bell manual board—and to give to the public fast, secret and accurate service automatically.

"Chicago is having prepared an automatic exchange for 100,000 subscribers; Grand Rapids has one now with a capacity for 19,000 and a present service of 5,000; Dayton, Ohio, has an automatic exchange of 6,000, with a capacity for 19,000 subscribers; at Columbus a 7,000 subscriber exchange with capacity for 19,000. The Northwestern Telephone Company has established an automatic exchange in Portland, Me., with a present capacity for 10,000 subscribers. Smaller cities all over the country have already secured many of the exchanges and are giving the service a practical test.

"So it is not necessary to say that the automatic telephone is unknown in specific communities. I approached it from the point of view of having tested it both abroad and in Washington, and with the curiosity of knowing how electricity can work for itself. If in the future that mysterious fluid or series of aerial waves—whatever it is—accomplishes one-half with modernizing the trolley car that it has accomplished in automizing the telephone we shall have almost ideal conditions in transmitting messages and in securing speedy and comfortable travel."

THE NATURE STUDY IDEA

BEING AN ACCOUNT OF HOW THE TERM ORIGINATED AND WHAT IT REALLY MEANS

By PROF. L. H. BAILEY, Editor of "Country Life in America."

I HAVE engaged in a large correspondence for the purpose of discovering something of the history of the nature-study movement. Oftenest, perhaps, I have been referred to the teaching of Agassiz at Penikese as the beginning, at least in this country. Agassiz, however, did not teach nature-study in the special sense in which we use this term, although he gave us the motto, "Study nature, not books." He taught the study of nature by the "Natural method." His instruction was given from the investigator's or the specialist's viewpoint, and it was intended primarily for students and adults. The present nature-study movement is a product of the elementary schools, not of universities, although many university and college men have been instrumental in forwarding it. Cornell was perhaps the first university to take it up as a distinct enterprise (1895), but the movement was already well under way in many places at that time. At this institution it became an extension-teaching movement. Professor C. F. Hodge of Clark University, under the inspiration of Stanley Hall, began popular work in nature-study in 1897.

The nature-study movement is a natural outgrowth of the modern teaching and investigating in what we call natural science. No doubt it has been quickened, as a school subject, by the making of what we know as outdoor books.

Nature-study is not primarily a natural-history subject: it is primarily a pedagogical ideal. Natural-history subjects are the means, not the end. Its beginnings are certainly as old as the time of Socrates and Aristotle. It is a fruit of the great educational reformers—Comenius, Pestalozzi, Emile Rousseau, Froebel and the rest. In a large measure, the spirit of our present-day nature-study movement—which seems so new to us—is a recrudescence. Just now it represents a reaction from the dry-as-dust science teaching.

What we may legitimately call nature-study began to take form in this country from 1884 to 1890. Who first used the term I do not know; and it is of small consequence, because the term may mean much or nothing. The term appears to have been at first a substitute for "object lessons," "plant work," "elementary science," and the like, because it came to be felt that these things represented mere intellectual ideals and school "methods." Dr. Piez, of the Oswego (N. Y.) Normal School, makes the following comment on the pedagogical origin of the nature-study idea: "I have come to the conclusion that nature-study in spirit, if not in name, is the direct descendant of object teaching. Object teaching aimed at the use of the senses in acquiring knowledge, and was introduced to displace the mechanical 'memory' method current in the schools. It was responsible for raising the problem of method among thoughtful teachers. But the 'lessons on objects' were justly deserving the criticism that they were disconnected, and that the knowledge resulting from them was a knowledge of facts not organized into a comprehensive whole."

Many schools in several states were introducing elementary science in the latter part of the eighties, and it seems that several of them began to use the term nature-study without knowing where or how the term was suggested. The nature-study idea is now widespread and thoroughly established. It marks an epochal change in the aims of education as regards science teaching.

As yet there are no codified methods of teaching nature-study. The subject is not a formal part of the curriculum; and thereby it is not perfunctory. And herein lies much of its value—in the fact that it cannot be reduced to a system, is not cut and dried, cannot become a part of rigid school methods. Its very essence is spirit. It is as free as its subject-matter, as far removed from museum and cabinet as the skeleton is from the living animal.

It thus transpires that there is much confusion as to what nature-study is, because of the different attitudes of its various exponents; but these different attitudes are largely the reflections of different personalities and the working out of different methods. There may be twenty best ways of teaching nature-study. It is essentially the expression of one's outlook on the world. We must define nature-study in terms of its purpose, not in terms of its methods. It is not doing this or that. It is putting the child into intimate and sympathetic contact with the things of the external world. Whatever the method, the final result of nature-study teaching is the development of a keen personal interest in every natural object and phenomenon.

There are two or three fundamental misconceptions of what nature-study is or should be; and to these we may now give attention.

Fundamentally, nature-study is seeing what one looks at and drawing proper conclusions from what one sees; and thereby the learner comes into personal relation and sympathy with the object. It is not the teaching of science—not the systematic pursuit of a logical body of principles. Its object is to broaden the child's horizon, not, primarily, to teach him how to widen the boundaries of human knowledge. It is not the teaching of botany or entomology or geology, but of plants, insects and fields. But many persons who are teaching under the name of nature-study are merely teaching and interpreting elementary science.

Again, nature-study is studying things and the reason of things, not about things. It is not reading from nature books. A child was asked if she had ever seen the great dipper. "Oh, yes," she replied, "I saw it in my geography." This is better than not to have seen it at all; but the proper place to have seen it is in the heavens. Nature-readers may be of the greatest use if they are made incidental and secondary features of the instruction; but, however good they may be, their influence is pernicious if they are made to be primary agents. The child should first see the thing. It should then reason about the thing. Having a concrete impression, it may then go to the book to widen its knowledge and sympathies. Having seen mimicry in the eggs of the aphis on the willow or apple twig, or in the walking stick, the pupil may then take an excursion with Wallace or Bates to the tropics and there see the striking mimicries of the leaf-like insects. Having seen the wearing away of the boulder or the ledge, he may go to Switzerland with Lubbock and see the mighty erosion of the Alps. Now and then the order may be reversed with profit, but this should be the exception: from the wagon to the star should be the rule.

Yet again, nature-study is not the teaching of facts for the sake of the facts. It is not the giving of information merely—notwithstanding the fact that some nature-study leaflets are information leaflets. We must begin with the fact, to be sure, but the lesson is not the fact but the significance of the fact. It is not necessary that the fact have direct practical application to the daily life, for the object is the effort to train the mind and the sympathies. It is a common notion that when the subject-matter is insects, the pupil should be taught the life-histories of injurious insects and how to destroy the pests. Now nature-study may be equally valuable whether the subject is the codlin-moth or the ant; but to confine the pupil's attention to insects that are injurious to man is to give him a distorted and untrue view of nature. A bouquet of daisies does not represent a meadow. Children should be interested more in seeing things live than in killing them. Yet I would not emphasize the injunction, "Thou shalt not kill." Nature-study is not recommended for the explicit teaching of morals. I should prefer to have the child become so much interested in living things that he would have no desire to kill them.

Nature-study is not merely the adding of one more thing to a curriculum. It is not co-ordinate with geography or reading or arithmetic. Neither is it a mere accessory, or a sentiment, or an entertainment, or a tickler of the senses. It is not "a study." It is not the addition of more "work." It has to do with the whole point of view of elementary education, and therefore is fundamental. It is the full expression of personality. It is the practical working out of the extension idea that has been so much a part of our time.

Nature-study stands for directness and naturalness. It is astonishing, when one comes to think of it, how indirect and how unrelated to the lives of pupils much of our education has been. Geographies begin with the earth, and finally, perhaps, come down to some concrete and familiar object or scene that the pupil can understand. Arithmetic has to do with brokerage and partnerships and partial payments and other things that mean nothing to the child. Botany has to do with cells and protoplasm and cryptograms. History deals with political affairs, and only rarely comes down to physical facts and to those events that have to do with

"The Nature-Study Idea," a volume descriptive of the New Movement for bringing children into closer touch with nature. Published by Doubleday, Page and Company, New York, N. Y.

the real lives of the people; and yet political and social affairs are only the results or expressions of the way in which people live. Readers begin with mere literature or with stories of things that the child will never see or do. Of course, these statements are meant to be only general, as illustrating what is even yet a great fault in educational methods. There are many exceptions, and these are becoming commoner. Surely, the best education is that which begins with the materials at hand. A child asks what a stone is, before it asks what the earth is.

If, in conclusion, I were asked for a condensed statement of the nature-study idea, I should choose the following definition of it by Professor Thomas H. Macbride, of the University of Iowa: "I should say that by nature-study a good teacher means such study of the natural world as leads to sympathy with it. The key-note, in my opinion, for all nature-study is sympathy. Such study in the schools is not botany; it is not zoology; although, of course, not contravening either. But by nature-study we mean such a presentation, to young people, of the outside world that our children shall learn to love all nature's forms and cease to abuse them. The study of natural science leads, to be sure, to these results, but its methods are long and have a different primary object."

A GIANT CANAL PROJECT IN RUSSIA

Translated from PAUL DEHN in "Illustrirte Zeitung."

DESPITE its enormous size, Russia has most inadequate connections with the open sea—the desolate sea of ice on the north coast, the Baltic on the northwest, the Black Sea and the Sea of Azov in the south, and with the Caspian, which is an inland sea. In accordance with this fact it must seem plausible that the leading politicians of the Russian Empire are making efforts to get direct communications with the open sea, and thus to reach the Mediterranean and the Indian Ocean by a direct water-route. Traffic on the inland seas has always been large, as the formation of the land and the nature of its waters facilitate inland navigation. Russia in Europe has navigable rivers that aggregate about 22,000 miles in length, and 3,650 miles of artificial waterways, of which 1,500 miles are rivers with regulated beds and 550 miles are canals and canalized rivers. The net of waterways that runs through Russia in Europe may be divided into an Eastern group, that connects with the Caspian, the Polar Sea and the Baltic, and a Western group, that establishes connections with the Black Sea and the Baltic.

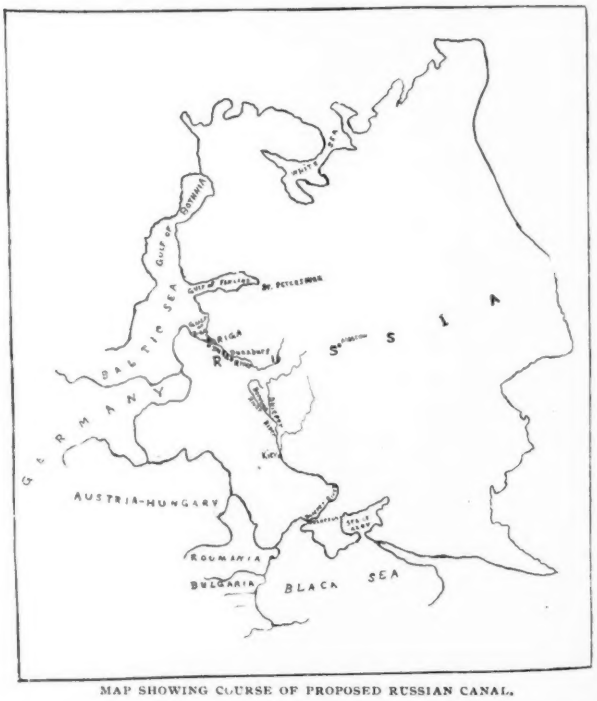
Up to the present time Russia has built only short canals to connect rivers, because the natural network of waterways in that country is very dense. Yet the plans for a far-reaching system of canals have been under discussion for some time. The first of these plans deals with a water-way from the Weichsel at Nowageorgijevsk to the Niemen, and from there to Windau, a distance of 675 miles. Several rivers, seas and canals are to be utilized in its construction. Its main object is to facilitate the exportation of Russian wheat from the harbors of the Baltic. Then a canal from Tagaurog on the Sea of Azov through the Don to Rostow and through the valley of the Manytsch to Sagansk on the Caspian Sea is being planned to connect the two above-named seas; and lastly a canal to make direct connections between the Baltic and the Black Sea.

This latter scheme of a canal on a grand scale has been talked about for more than a decade. French contractors, supported by M. Fleurens, a member of the ministry, who had an audience bearing on this matter with Czar Alexander III., and who was considered a grantee at the time, first took an active interest in the prospective canal. In 1892 a society called Societe d'etudes du canal maritime Russe was organized in Paris. A detailed plan that had many short-comings was prepared by this society, after the necessary investigations had been made from 1892-1894. But no further progress was made, in spite of the fact that political influences were brought to bear on the matter, and nothing more has since been heard of the French society. Now an Anglo-Russian company wants to build the canal within five years, with a capital of $99,550,000. New plans, based on the original drawings made by the French engineers, have been prepared by Russian engineers and submitted to the bureau of road construction.

The new water-way will start at Riga, follow the course of the Duna to Dunaburg, where the canal proper begins. This canal is to connect with the Beresina at Sepel. The further course of the waterway leads along the Beresina until it empties into the Dnieper, then along the latter river to Kherson on the Black Sea. Riga, Dunaburg, Kiev and Ekaterinoslav, where extensive harbors are being constructed, are among the sixteen cities that lie along the route. Available rivers are to be utilized in the construction of sub-ways from Dunaburg to Disna, from Rjetschiza to Orscha, from Kiev to Mosir and Schitomir, and from Ekaterinoslav to Poltava. The waterway is to be about 1,150 miles long and only 130 miles of the entire stretch will require an artificial canal, while the rivers along the route are to be used. The work of deepening and regulating these rivers is the most important part of the task. The estimated cost is not excessively high, and the technical problems do not present unusual difficulties, owing to the favorable conditions.

There are three main difficulties to overcome. At the mouth of the Beresina a height of 390 feet must be crossed; it will be necessary to intersect the river Pripet near Kiev, and the rapids of the Dnieper between Ekaterinoslav and Aleksandrov, which have always been a menace to navigation, will have to be removed.

This new inland sea-route will connect the two seas in the most practical manner. The surface of the water will measure 210 feet, the bottom will be 110 feet wide, and the entire waterway is to be 26½ feet deep throughout, so that the largest warships can pass through. Russia is trying to gain the advantages that Germany is deriving from the canal that connects the North Sea with the Baltic, the same advantages that France will enjoy when her two-sea-canal project has become a reality. Both countries want a large inland water-route to join their dispersed fleets, and also to establish connection between their wharves. If the Bosphorus and the Dardanelles should be blockaded in case of a war, the Russian Black Sea Squadron could be transferred to the Baltic and commence action there.



MAP SHOWING COURSE OF PROPOSED RUSSIAN CANAL.

It will hardly be an important factor in international intercourse, although the canal is longer than any other and its facilities for traffic are unexcelled. The distance is a great deal shorter than the much-traversed road by sea, being only 4,150 miles from the Baltic to the Black Sea and 2,400 miles from the Baltic to Port Said. In spite of this competition the sea-route will hold its own, because of its lively traffic as compared to the probable lack of commercial interest in the Russian inter-sea canal. Germany, in particular, will continue to trade with the Levant by using the sea-route, mainly because of the numerous intermediate stations, which are an important factor in international commerce.

UNEXPLORED PARTS OF THE WORLD

FEW BLACK SPOTS LEFT ON EARTH'S MAP, BUT ARCHÆOLOGY OFFERS NEW WORLDS FOR THE FUTURE INVESTIGATOR TO DISCOVER

AT the dawn of the nineteenth century over four-fifths of the earth's surface was unexplored; at the dawn of the twentieth only one-eleventh was still undiscovered. What parts of the world are even yet painted black on the official maps, and what new worlds remain to be discovered, are the topics interestingly treated by Mark Sullivan in The Boston Transcript. He says:

"The ambitious explorer of today would be a most absurd fellow and as ignorant as Alexander if he were to sit down and weep because there were no more worlds for him to discover. Recent news despatches plainly show there is still much interest and even romance in the explorer's life, although the dark spots have almost wholly disappeared from the maps. In Egypt, Mr. Theodore M. Davis of New York has made a discovery of epoch-making value to archaeologists. After working for two years unrewarded, he uncovered early in March a passage cut into solid rock, which he believed might lead to the tomb of another Pharaoh. He closed his excavations temporarily, summoned a council of eminent Egyptologists who should be able to record scientifically every detail; and, at their convenience, broke the seal of the tomb and stepped into a vault which had been closed for three thousand years. The reward of his labor was unusually rich —there were paintings and inscriptions, vases of variegated and opaque glass, tapestries containing hieroglyphic inscriptions, and, above all in interest the actual chariot in which this Pharaoh rode at Thebes described as the finest specimen of art which has come down to us from antiquity.

"So rich a reward for an explorer's labors shows that even if one may no longer discover a new continent, he may still find something just as important to the intellectual world. Exploring is far from being a lost art. As a matter of fact it is just becoming an art and passing out of domain of blind strength and force. If you wish to go into the Arctic, you will find in the Royal Geographical Society's rooms in London data as to just what clothing combines the greatest heat with the least weight; just what dog food constitutes the least burden with the greatest kinetic energy, and other invaluable information. If you wish to cross the Sahara, there are scientific facts as to exactly how much food a camel of a given age must have and just how many days and hours he can safely go without water. This carefully compiled information makes exploring a fine art. The explorers of today do not fill the public eye as Livingstone did, partly because their work does not appeal to the popular imagination, but chiefly because there are a hundred times as many of them.

"The great explorers, it is true—the picturesque ones who could name continents after their patrons and seas after their intimate friends—are necessarily of the past. A naive Harvard Freshman at a reception to Stanley, when the great explorer was last in America, said, 'I should like to be as famous as you are, and in the same way; how can I do it?' Stanley replied, bluntly, 'Try the moon.' This was Stanley's way of saying he is the last of his kind. In the Valhalla of explorers there is room for just two more—the discoverers of the north and south poles; when they have entered, the doors will close until some future Columbus shall approach a modern Isabella—it will probably be a Morgan or a Rockefeller—with a ludicrous scheme for reaching the moon.

"But granted a young man who, realizing there are no more vast worlds to conquer, is willing to do the best he can and take the largest piece of land yet remaining unexplored—where shall he go? Let him go first of all to the Royal Geographical Society's rooms in London. He will find there a series of maps on which the known world is marked white and the unexplored black. The largest solid black spot now left is a miniature one placed in the southern half of Arabia. It is curious that the largest uncrossed area should remain in Asia, first known to the human race, while those continents recently discovered are thoroughly explored.

"But while Arabia furnishes the place where you can walk farthest in a straight line without crossing the track of any other white man, it is hardly fair to speak of it as the greatest unknown area. Its edges have been touched at every side and its character is thoroughly well known as a barren, sandy desert, the crossing of which would be of no importance or interest except as a bravado test of endurance.

"Generally speaking, central South America is the least known section of any continent. On the Royal Geographical Society's maps, the Amazon River basin appears as a solid black stretch, with narrow white lines, like the fingers of a spread hand, following the tributary rivers. This means that explorers have gone up the rivers and come down again, but have not penetrated any distance overland across the jungle-covered watersheds.

"'The Great Sahara Desert,' as the old school geographies used to put it, is to the popular mind a land of awe-inspiring mystery. But there are now four broad white trails of exploring caravans across it from north to south, and while there is still plenty of unexplored area between the lines of travel, it is in small tracts. (And a French explorer declares that the Sahara isn't much of a desert anyhow, but is reasonably fertile!) The centre of Africa, too, is pepper-dotted with black spots, but there is a railroad to Victoria Falls and telegraph wires cross the sources of the Nile!

"Australia still promises mystery, as well as hardship without limit, to those who attempt to cross the western part of it; and in North America there are yet two small black areas; one is between Labrador and Baffin's Bay, not far south of the Arctic Circle. Indians go in there every winter and come out in the spring with furs for the Hudson Bay Company's factors on the coast. The other North American terra incognita is in the hinterland of Alaska, just west of the McKenzie River's mouth.

"While it is said there are no more worlds for explorers to conquer, the Arctic and the Antarctic are not considered, as they involve a special difficulty quite apart from the ordinary problems of land exploration. There is about the North Pole an area of unknown land and water as large as the continent of Europe, and twice that area lies about the South Pole. Abruzzi has dragged his sledges 86 degrees 33 minutes north, and Borchgevrink has been 78 degrees 50 minutes south; but, generally speaking, all north of 73 degrees and all south of 68 degrees is terra—and aqua —incognita.

"While the interior of Asia contains no more secrets for the geographer, it is still a land of human mystery. Although it contains only a few very small black spots on the Geographical Society's maps, it is yet the most prized goal of adventurous travelers. It is still possible for explorers to come back from Central Asia and name their books, 'Across Forbidden Lands' and 'Through Closed Gates.' Not a dozen Europeans have been into Thibet; not one has been in Lhasa, the sacred city of the alleged reincarnation of Buddha. Last year a Buriat Buddhist, who had been a student at the University of St. Petersburg, by virtue of offering to be a pious follower of the faith bent on a holy mission, succeeded in reaching Lhasa and in bringing away 319 volumes, written by renowned lamas during the past nine centuries, containing an exposition of philosophy, astronomy, history and geography, as these sciences are understood by the lamas of Thibet. Sven Hedin also has just returned from an informing journey across Central Asia, including Thibet. These, however, are but scratching the surface of mystery with a pen. In their customs, their mental attitude and their habits of thought, the people of Thibet are today creatures of that sort of mystery which the ancient geographers intended to imply when they scattered centaurs and unicorns about the unknown edges of their maps. Kipling was happily placed. In the mysterious North, back of the Himalayas, he could lay the scene of any tale he chose, even that of the 'Man Who Would be King,' and none could say it was impossible.

"Compare the Geographical Society's maps of the areas still unknown with maps that would have been similarly constructed one hundred years ago. Australia was all black—not even the outlines of its coast were known; around Africa there was a narrow white band scarcely wider than the space between high and low tide—the vast interior was virgin fields for Mungo Park and Livingstone; North America, west of the Mississippi and north of the Rio Grande—more than half the continent—was waiting for Lewis and Clark. To put it in figures, in 1900 less than one-eleventh of the world's surface was unexplored; in 1800 less than one-fifth was known. The nineteenth century explorers had all the land for themselves; similarly, the sea had been the harvest of Magellan, Raleigh, Drake and Captain Cook; for the future the dark continent is the bottom of the sea, which Maury and Murray

and the cable surveyors have only touched. There is, however, but little romance, little excitement and little poetry in this field. You drop a dredge two or three miles to the bottom of the sea and bring it up full of fish, mutilated; for fish which live normally under a pressure of several tons of water burst on being brought to the surface.

"But if romance has gone, plenty of interest remains, exploring has ceased to be extensive and has become intensive; you may no longer have a continent or a sea named after you, but you may be immortalized in the name of a new variety of butter-fly. The old adventurers had no object but land, more land, and yet more land for the glory of the king. If they happened to see something monstrous it was mentioned; otherwise, flora and fauna were not even incidents. It is these, however, that furnish work for the modern explorers. For them there is still an occasional prize. Only two years ago the okapi, an African mammal almost as large as the giraffe, was discovered by Sir Harry Johnston; but at the present stage of progress explorers must usually work with a microscope. In this field the things to be done are practically boundless.

"In ethnology no future explorer is likely to be startled by a new race or by a tribe of dwarfs, but there is an untouched field in which men may study primitive manners, primitive religions, primitive tongues, and from the data thus gained determine race origin and race relationship.

"Professor Delitzch and Sven Hedin have demonstrated that excitement has not entirely disappeared from the explorer's life. The archaeologists at work in Syria are uncovering facts as important to the intellectual and religious world as a new continent to the physical. There may not be danger, but to an imaginative mind there must be rare romance in uncovering, by a stroke of the pick, the wine-cellar of an Assyrian king, with the red dust of the wine dry in the bottles."

EUROPEAN VIEW OF AIR LOCOMOTION

THE LATEST IMPROVEMENTS IN FLYING-MACHINES AND ONE IN PARTICULAR THAT MAY PROVE SUCCESSFUL

By RAIMOND NIMFUHR OF VIENNA

IT is gratifying to learn that the technical problem of making a practical flying-machine is nearer its solution than ever before, since it is gradually passing the unfruitful stage of theorizing. Spurred on by a prize of $100,000, offered by the St. Louis Exposition for a practical balloon air-ship or a flying-machine without a balloon attachment, the United States is in the lead in its endeavors to fulfil the requirements of the contest. Europe has done a great deal of theoretical work, too much, in fact, for useful purposes.

In studying the history of the development of the flying-machine during the past decade, one conspicuous fact attracts our notice. The significance of the results achieved by the ingenious air-ship inventor, Otto Lilienthal (who was killed in 1896 while making an experiment), has not yet been fully recognized in Germany and in Austria, in consequence of which much time and money is being wasted on unpromising plans, while Americans, aided by their gift of practical insight, did not fail to appreciate Otto Lilienthal's life-work, and to develop his fundamental principle—the art of individual air-locomotion—with very good results.

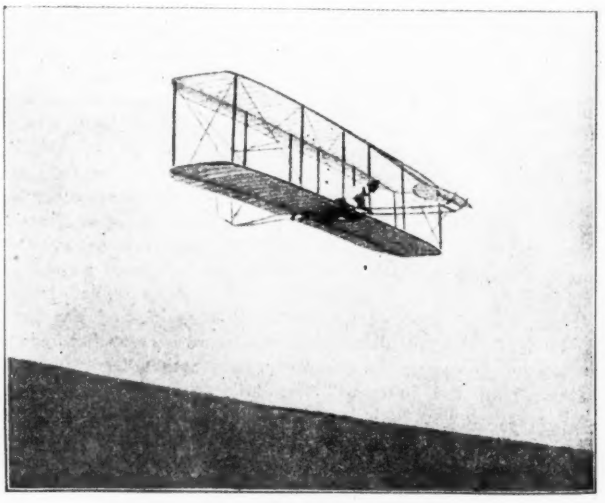
Very interesting experiments with an apparatus constructed on this same principle have been made during the past two years by Wilburn and Orville Wright of Dayton, Ohio. There was no accident of any consequence while these experiments were in progress. The new sliding-machine invented by the Wright brothers is shaped somewhat like the second type constructed by Octave Chanute. Like the latter, it has two carrying planes, placed perpendicularly, one above the other. When the machine is in operation the planes are turned horizontally, or at a slight angle in the direction to be traversed. A smaller plane is adjusted in the center of the lower carrying plane a short distance from the fore-side, where it can be turned on an axis that is placed perpendicularly from the direction taken by the machine. This preserves the equilibrium and acts as a rudder. The sides are steered by turning the carrying planes to one side.

The first experiments with this new gliding machine were made at Kitty Hawk, North Carolina. The construction of an apparatus having an area of 63 square feet had at first been planned, but it was impossible to find the material required for so large a machine. Carrying planes measuring 50 square feet are the largest that have been made with this machine. It was first launched as a kite, when the wind was blowing at a velocity of 24 to 30 miles. The carrying plane inclined at an angle of about 20 degrees when the wind's velocity was 24½ miles. The first tests showed that the new method of regulating the side balances is much more satisfactory than the former way of shifting the hull's center of gravity. The country around Kitty Hawk was not well adapted to flights made on the gliding principle, so the sand-hill "Kill Devil," four miles south, was selected.

In September and October of last year the Wright brothers made experiments with a new and very much improved machine, which has two carrying planes, each measuring 35 feet in length and 5⅛ feet in width. The entire surface measures 91 square feet. Seven hundred consecutive glides were executed by this machine. The results were very much better than those attained by machines of an earlier date. The course inclined only 6½ to 7 degrees towards the horizontal line, and only 5 degrees when the flights were shorter, averaging from 146-195 feet. In such case better speed was attained when the machine ascended, the downward course being slower.

The floating velocity of the apparatus was about 26 feet a second, but the best results were obtained when the wind's velocity was 34 feet. It was very difficult to start the machine when the wind traveled less than 9¾ feet a second, because it was almost impossible to get the requisite starting force of 16¾ feet a second. The most successful flights were accomplished when the wind traveled from 26 to 32½ feet a second, yet it was found possible to travel in perfect safety when the wind's velocity was 54 feet. The longest flight was 615 feet in 26 seconds, which averages a rate of speed of more than 24 feet a second.

To begin operations two men lifted the machine and started



THE FLYING MACHINE OF THE WRIGHT BROTHERS.

it on its course. The steersman occupied an almost horizontal position at the start, and he landed without having changed his position. The apparatus obeyed the slightest move made by the rudder. It was possible for the steersman to scrape the ground as he followed its undulations, or he could sail away on a level with the starting point and glide along high above the foot of the hills, then come down to earth gradually. All these experiments were made without any disastrous results.

The invention made by the Wright brothers does not embody the ideal flying-machine, which would enable us to execute flights of several miles when the wind is blowing at a high rate of speed, without using the motor as an aid, but it gives evidence of remarkable progress when compared with the primitive and comparatively unstable machines constructed by Lilienthal and Pilcher. The accompanying illustration shows the machine with its steersman sailing rather high up in the air.

THE SCIENTIFIC SIDE OF GOLF

AN EXPERT GOLF INSTRUCTOR EXPLAINS THE TECHNICAL FEATURES OF THIS POPULAR OUTDOOR GAME

By CHESTER G. HORTON, Edgewater Golf Club, Chicago.

GOLF is probably the most scientific of all out-door games, requiring as much accuracy of stroke as tennis, and far more judgment than cricket or baseball. The fascination which makes it the game of all games is that the mental as well as the physical make-up of the player enters into it, no man excelling at it, no matter how mechanically correct he may play, unless his personal characteristics are a part of every stroke he makes. No other game requires such a variety of physical and mental adjustments, and no other game gives so complete a measure of the whole man.

Golf may be played on any good, clear stretch of ground, where the grass is not too rank; and, although it is preferable to have it with no hills, many good courses have been laid out in a hilly country. The very best turf for golf is of the variety found usually only on the sea coast, viz., a sandy subsoil, covered with short, crisp turf, the roots of the grass extending perhaps one inch downward.

The soil on the links of the Atlantic City Country Club is the nearest to the ideal of any to be found in America. The evenness of the ground should be broken at intervals with excavations or elevations preferably natural, but artificial when necessary, which are called "bunkers," and in the avoidance of which, in playing over the course, skill comes particularly into use.

Golf courses are usually called "links," not that the word has anything to do with the game, but more because the sandy stretches of land along the Scottish coast, where the game was first originated, are so called.

A golf course, properly speaking, should consist of eighteen holes, arranged at distances from each other from 100 to 500 yards. If the amount of ground available for a links is insufficient for eighteen holes, a lesser number, usually nine, may be laid out, and the game played in the same way, twice around the nine holes, instead of once around the eighteen.

The holes should be laid out in a sort of rough circle, in order that the players may be near the starting point when they finish, and also in order that the outgoing or incoming players may not conflict with each other.

The distances of the holes should be arranged so that it will require one, two, three, four or five full shots, as the case may be, to reach the putting green. This green should be sixty feet square, and should be as smooth as it is possible to get it. The location of the holes should be designated by a disc or flag on the end of a three-foot pin, which, in turn, should be set into the bottom of the hole. This should be four and a quarter inches in diameter, and not less than four inches deep. These holes should be changed as often as the grass directly around them shows signs of wear, but they should be kept as near the center of the green as is possible. The teeing ground, or place where the start for each hole is made, should be marked, so that it may be readily designated, and as near to the last hole as possible.

The idea of the game is to put a small gutta-percha ball into a series of holes in the least number of strokes, and it can be played as follows:

Singles—Two persons playing one against the other, each person having a ball, and counting by holes and not by the strokes taken for the whole round.

Foursomes—Two persons playing against the other two, the partners playing alternate strokes, each side having its own ball.

The usual play is "hole play," that is to say, the game is decided by one player having won more holes than his opponent, the total number of strokes taken to "do the course" not being considered, and each hole being decided separately and being won by the player who makes it in the least number of strokes.

A medal play, the player who makes the whole round in the least number of strokes is the winner.

At the commencement of the game, the player puts a little pat of sand down on the teeing ground, and puts his ball on top and strikes or "drives" it as far as he can in the direction of the first hole. After that, until he "holes" his ball, he must play it strictly from its place as it happens to be, in sand, bunker or elsewhere, and not touch it again until he picks it out of the first hole, and so on until he has gone around the course.

The most difficult to master, the most important, yet apparently the easiest part of the game, are the "approach" shots and "puts." Driving plays a less important part in deciding matches, although no one who could not drive fairly well could hope to excel in golf.

The average length of a fair drive may be said to run between 175 to 200 yards, provided there is no exceptional advantage or disadvantage, like a hill or a strong wind, although it is a recorded fact that the late lamented F. G. Tait, at St. Andrews, Scotland, once drove a ball all-carry, which an accurate measurement declared to be 280 yards, while Harry Vardon, the English champion, has frequently driven over 250 yards in his matches on this side of the Atlantic.

APPROPRIATIONS FOR PUBLIC SCHOOLS AND POLICE

ONE of the strongest arguments advanced for increased expenditure on the public schools in large cities is seen in a statement which has been prepared showing the ratio of amount spent in maintaining the public schools and for the police department. Such a table shows more strinkingly than words could convey how small comparatively is the amount spent in educating future American citizens.

It appears from the table herewith that of the twenty largest American cities one spends less for schools than for police; thirteen spend less than twice as much for schools as for police; four spend less than two and a quarter times as much for schools as for police; one spends three times as much, and one three and four-tenths times as much. These ratios are remarkable, considering that police, however indispensable, only protect the community partially from crimes, disorders, and nuisances—that is, from the grossest forms of evil—while schools build up in intelligence and character the human constituents of the future community itself. This table was prepared at the instance of Professor Calvin M. Woodward, of St. Louis, by the Bureau of Education at Washington, which relied for the facts concerning the police departments on Bulletin No. 42 of the Department of Labor, September, 1902.

City	Spent for public schools (buildings omitted).	Spent for Police Dept.	Ratio
Minneapolis	$ 736,981	$ 216,698	$3.40 for schools to $1 for police.
Cleveland	1,257,345	417,932	3.01 for schools to $1 for police.
Milwaukee	764,968	342,508	2.24 for schools to $1 for police.
Chicago	8,203,493	3,685,982	2.23 for schools to $1 for police.
New Orleans	478,025	231,374	2.07 for schools to $1 for police.
Cincinnati	1,126,631	555,185	2.03 for schools to $1 for police.
Providence	739,695	371,875	1.99 for schools to $1 for police.
Newark	830,081	428,495	1.94 for schools to $1 for police.
New York	19,731,629	10,199,206	1.93 for schools to $1 for police.
Louisville	512,947	273,615	1.87 for schools to $1 for police.
Boston	3,043,630	1,754,151	1.73 for schools to $1 for police.
Washington	1,182,916	687,922	1.72 for schools to $1 for police.
Pittsburg	843,648	490,287	1.72 for schools to $1 for police.
Detroit	869,713	542,049	1.60 for schools to $1 for police.
San Francisco	1,166,763	789,251	1.48 for schools to $1 for police.
Buffalo	1,161,834	793,294	1.46 for schools to $1 for police.
Baltimore	1,417,392	967,823	1.46 for schools to $1 for police.
Jersey City	500,332	421,616	1.16 for schools to $1 for police.
Philadelphia	3,319,604	3,036,264	1.09 for schools to $1 for police.
St. Louis	1,526,140	1,602,182	0.95 for schools to $1 for police.

DRS. WILEY AND BIGELOW INSPECTING THE DISHES IN THE DRYING OVEN TO SEE IF THEY ARE READY FOR WEIGHING.

EXPERIMENTS WITH FOOD PRESERVATIVES

WHAT THE BUREAU OF CHEMISTRY IS DOING IN BEHALF OF THE PUBLIC HEALTH

THE experiments in food preservatives which are now being conducted by the Bureau of Chemistry in the Department of Agriculture at Washington promise to be of great value to the country and their influence will undoubtedly be felt around the globe. In view of the great and increasing number of prepared foods it is becoming a recognized fact that the public is entitled to an exact knowledge of what it purchases. In recognition of this by an Act of Congress, approved on June 3, 1902, funds were provided "to enable the Secretary of Agriculture to investigate the character of proposed food preservatives and coloring matters, to determine their relation to digestion and to health, and to establish the principles which should govern their use." This work is now being actively carried on under the direction of the Chief of the Bureau of Chemistry, Dr. Harvey W. Wiley.

Early in December of last year a kitchen and dining room were fitted up in the basement of the building occupied by the Bureau of Chemistry, after which application was made to the Civil Service Commission for a cook, and an expert was obtained, whose skill and knowledge were certified to by several of the bon vivants of Washington. The selection of young men on whom to experiment was not so easy. Volunteers were called for and in time Dr. Wiley succeeded in obtaining a dozen or more young men, chiefly from his own Bureau, who were willing for the cause of science to submit themselves to the experiments.

"In order to secure the desired results" writes the special Washington correspondent of the Scientific American, "it became necessary to determine a series of facts concerning the subjects. Accordingly they were at the outset critically examined by a physician from the Bureau of Public Health and Marine Hospital Service, and then for a period of time were fed on pure food, so as to determine exactly what quantity of food was necessary for their normal diet. That is to say, each man throughout the entire course of the experiments is allowed only the same amount of food, which, however, may vary with the individual, but which amount is determined after experimentation to be just enough to maintain the individual in a normal condition. Charts were prepared for each person, on which the weight is daily recorded, and also a record made each day of the temperature taken before and after dinner. The number of heart beats and the respiration are determined twice daily, the blood corpuscles are counted, and the amount of hemoglobin in the blood measured. Of course, it is understood that the subjects were pledged to eat only the food given to them by Dr. Wiley, and to refrain from the use of stimulants, although tobacco is allowed during the experiments in the regular manner in which it had been used.

"The selection of the first substance to be experimented with was considered, and borax was chosen, concerning which it is generally admitted that it is a most excellent preservative, especially for meats and dairy products. A small quantity of borax will act as a preservative just as well as a large quantity of salt. Therefore, admitting, for the sake of argument, that borax taken in certain quantities does derange the physiological functions, it is probable that it does not do so to such an extent as does the larger quantity of salt which must be used as its substitute. In the case of meats, if preservatives are really injurious, the injury is a necessary evil unless the meats are preserved solely by the canning process. In some instances, such as with hams and breakfast bacon, this method would practically destroy the qualities of those meats which are most desired.

"The young men having reached a normal condition, that is, possessing a constant weight, and the proper amount of food for each having been determined, they were divided into two sets of six each, and the experiment began. One set was fed with pure food only, and the other set with food to which borax, in increasing amounts, was added, and the effect on metabolism noted. These experiments continued for about four weeks, when the young men changed. That is to say, those who had been eating the food to which borax was added were now fed only on pure food. There was also a special set, consisting of two young men, who were fed continuously on food containing borax. It is understood, of course, that the object of the investigation is to ascertain the changes that occur in the subject, in consequence of the use of the special preservative employed, which in this instance was borax. Therefore, the exact quantity of food required normally by the individual being known, he is given exactly that amount, with the addition of varying proportions of borax. The food is carefully analyzed, so that it may be known exactly how much of each ingredient is given to him, and all that is excreted, both solid and liquid, is carefully weighed and analyzed. By striking a balance, the precise amount assimilated is determined, and the changes in weight or metabolism show the results of the value of the food on the individual. It may be added that the services of some twenty chemists and assistants are required for the various analyses that are essential in this investigation."

The young men enjoy meals which others might envy. For breakfast, which is served at 8 o'clock, a cereal, meat with mashed potatoes, bread and butter, and coffee with milk, are furnished. At 12, a luncheon is provided, consisting of soup, bread and butter, fruit and milk. The dinner is more elaborate, and occurs at 5:30 in the afternoon, and a typical meal is the following: Roast beef, mashed potatoes, string beans, bread and butter, milk and sugar, with boiled rice as a dessert, and coffee. In order that the proportion of meat may be constant in its value, and so that a fair sample may be secured for analysis, it is ground up before it is served. The bread is specially prepared on a constant formula. Condiments, such as salt, pepper, and certain spices, are permitted, but the quantity taken by each invidual is determined. If it were not for the constant thought of preservatives and the careful watch of every act of their daily lives, such a diet as the young men enjoy might be eagerly sought after.

It is generally assumed that the experiments with borax will be continued until June, when a further selection from substances, such as benzoic acid, formaldehyde, salicylic acid, sodium benzoate, and sulphurous acid, will probably be made. It is expected that several years will elapse before the entire series of experiments will be completed.

As to the ultimate value of the result to be obtained, it may be said that the information will be of service in shaping intelligent legislation, regulating commerce in food products, securing the removal of unnecessary and unjust restrictions, and making effective those that are necessary and just. It will serve as a basis for international agreement in regard to the composition of preserved foods. At present different nations have widely different laws to protect and regulate the importation and exportaton of food products. The experiments will serve also as a basis for rational advice on the part of hygienists and physicians in regard to the foods that should be or should not be used by persons in ordinary health, and they will be especially valuable in the treatment of invalids. The investigation will produce results which will tend to conserve the public health and guard the invalid and the weak person from injurous substances.

THE SPEECH OF THE MONTH

ANDREW CARNEGIE TELLS OF THE COMING UTOPIA OF THE WORKINGMAN, WHEN LABOR AND CAPITAL WILL BE HARMONIZED

MR. ANDREW CARNEGIE, upon recently being elected president of The Iron and Steel Institute, delivered an address upon the relations of labor and capital, in which he predicted a final and happy solution of the vexed problem. He said in part:

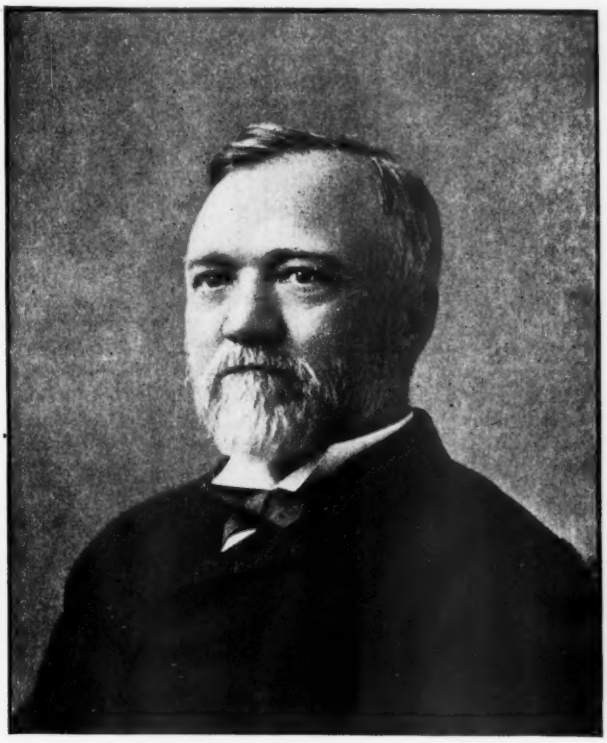
"One of the chief sources of whatever success may have attended the Carnegie Steel Company was undoubtedly its policy of making numerous partners from among the ablest of its men, and interesting so many others of ability in results. I strongly recommend this plan to the members of the institute engaged in business, believing that in these days of threatened exhausting competition it will be the concerns which adopt this plan, other things being equal, which will survive and flourish.

"Disputes of some kind between capital and labor are always in evidence, but it must never be forgotten that in the wide fields of domestic service and in that of the few employes with a working master, which embraces by far the greater number of wage-earners, all is, upon the whole, satisfactory—there reigns peace with the inevitable individual exceptions.

"We see in this encouraging fact the potent and salutary influence of the personal element. The employer knows his men and the men know their employer—there is a mutual respect, sympathy, kindly interest and good feeling.

"If the managing owners and officials of great corporations could only be known to their men and, equally important, their men known to their employers, and the hearts of each exposed to the other, as well as their difficulties, we should have in that troublesome field such harmony as delights us in the domestic. It is mainly the ignorance of contending parties of each other's virtues that breeds quarrels everywhere throughout the world, between individuals, between corporations and their men—and between nations.

"While, as you have seen, the Carnegie Steel Company interested its young men as partners and was always anxious to reward exceptional service, and carried the bonus system to an extent, perhaps unknown in any similar organization, the masses of the ordinary workmen could not be embraced under the limited partnership form, even if it had been thought that their savings should be so invested. The objection to this from the point of view of the workman, which always arose in our minds and which we were never able to surmount, was the sad and instructive history of the largest manufacturing concerns, especially those of iron and steel. More than once in the history of the Carnegie Steel Company leading partners have been so doubtful of its future as to beg their more optimistic senior partners to buy large amounts of their interests at actual cost.



ANDREW CARNEGIE

"You know too well, gentlemen, how the path of iron and steel is strewn with financial loss in all countries, and that all forms of business must encounter great risks. Scarcely a week passes without news of embarrassment or failure in the industrial world. This it has ever been, and ever must be, while human nature remains unchanged.

"Bearing all this in mind, the thought of asking the workingman to risk his precious savings in the manufacturing or any form of business was always discarded by us as too dangerous for him. He was advised to buy a home instead and save his rent. To facilitate this, money to build homes was lent to the employes who had the ground clear of debt. It was believed that this was the safest and, therefore, the wisest use of their savings which workingmen could make.

"There is another point of view: the influence upon the prudent workman of distracting anxiety in regard to the absolute safety of what may be his sole provision for old age. He will see every morning the Stock Exchange quotations, for the American workman reads the papers. Only recently he would have seen the preferred stock of the United States Steel Corporation temporarily quoted lower than the price charged for it to him. This may mean little to the men of affairs familiar with the ups and downs of the mercurial Stock Exchange. But what must be the effect upon the uninformed workman? Of this I am well assured: the workman whose thoughts are upon the speculative surprise of the Exchange will not prove desirable. Speculation is the parasite of business feeding upon values, creating none, and is wholly incompatible with the satisfactory performance of other regular work requiring constant care and caution. The workman's investment should never be at risk, for if his thoughts are upon the Stock Exchange they cannot be upon the machinery; and machinery, like art, is a jealous mistress, brooking no rival claimant to its absorbing demands. In the interest of the employer, therefore, as well as that of the workman, the savings of the latter should be secure. Here, as in other respects, their interest is mutual, and hence I believe the needed change will be made by the Steel Corporation in the near future.

"We may look forward with hope to the day when it shall be the rule that the workman is partner with capital, the man of affairs giving his business experience, the workingman in the mill giving his mechanical skill to the company, both owners in the shares and so far equally interested in the success of their joint efforts, each indispensable, without whose co-operation success were impossible. It is a splendid vista along which we are permitted to gaze.

"Perhaps I may be considered much too sanguine in this forecast, which no doubt will take time to realize, but as the direct result of my experience I am convinced that the huge combination, and even the moderate corporation, has no chance in competition with the partnership which embraces the principal officials and has adopted the system of payment by bonus or reward throughout its works. The true corporation is that whose shares are upon the Stock Exchange and whose real owners change constantly and are often unknown even to the president and directors, while to the workmen they are mere abstractions. It is impossible to infuse through their ranks the sentiment of personal regard and loyalty.

"The idea of making every workman a capitalist and of sharing large percentages of the profits among those rendering exceptional service will probably encounter the opposition of the extremists on both sides—the violent revolutionist of capitalistic conditions and the narrow, grasping employer, whose creed is to purchase his labor as he does his materials, paying the price agreed upon and there end. But this proposition will, we believe, amount to little. It will even speak well for the new idea if scouted by the extremists and commended by the mass of men who are on neither dangerous edge, but in the middle, where usually lies wisdom."

OVR DAY

PUBLISHED ON THE FIFTEENTH OF EACH MONTH AT 112 LASALLE AVE., CHICAGO.
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OUR DAY
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Vol. XXII MAY, 1903 No. 5

Lord Kelvin on the Trend of Science.

A PROFESSOR in an English university recently delivered a lecture in which he stated that science neither affirms nor denies the presence of a creative intelligence in the universe. Lord Kelvin, doubtless the most eminent scientist living, happened to be in the audience, and at the close of the address arose and said he was compelled to disagree with the professor, as he firmly believed that science leads to the conclusion that there is a directive and creative power in nature which upholds all things.

The New York Times reports the position taken by Lord Kelvin as follows: "Lord Kelvin was more successful than most eminent scientists have been in an effort to show that science leads steadily toward, rather than away from, a sound religious faith. He challenged the postulate that with regard to the origin of life science necessarily denied creative power. He insisted that science must positively assert and defend the existence and operation of a creative intelligence. Science makes everyone feel that he is in himself a miracle, since it is not in matter that the man lives and moves and has his being, but in the creating and directing power, to the recognition and acceptance of which science inevitably and irresistibly leads the student of nature.

"The scientist could not escape from such recognition when he studied the physics and dynamics of living and dead matter. Modern biologists are coming once more to a firm acceptance of something, and that is a vital principle. They had an unknown object put before them in science; and in thinking of that object they are all agnostics. They only know God in His works, but in Lord Kelvin's opinion they are forced by science to admit and to believe with absolute confidence in a directing power—an influence other than that residing in physical, dynamical, or electrical forces. There seemed to him nothing between absolute belief in creative power and the acceptance of the theory, which even Cicero discarded, that living things could have come into existence by a fortuitous concourse of atoms. This statement from so high a scientific authority will give pleasure to a great many people, and it is a cause for satisfaction that Lord Kelvin found himself able to make it."

The Progress of Profit-Sharing.

SLOWLY but surely the idea of profit-sharing is winning its way, being now in operation in some of the greatest industrial establishments of the age. Twenty-five years ago it was considered a beautiful ideal, but too utterly Utopian to become a reality in this work-a-day world. Today no less a personage than Andrew Carnegie, the man who built up the greatest steel industry in America, declares in favor of it, and says it was one of the factors that enabled his company to achieve its phenomenal success. In his recent speech in England in accepting the Presidency of the Iron and Steel Institute, he described at length how the profit-sharing plan had been carried out in his plants. Mr. Carnegie went so far as to prophesy that in the near future profit-sharing will be the rule and not the exception in the industrial world.

The Iron King's description of how profit-sharing worked in his own firm is thus summarized by the Public Ledger of Philadelphia:

"Mr. Carnegie described the limited partnership system of the Carnegie Steel Company as containing, in germ at least, the solution of the labor problem. Certain promising young men of the establishment, who had demonstrated their capacity and ability by the results achieved by them, were taken into the company, their shares being paid for by the profits of the concern. The stock was not transferred until the shares were fully

"Get them all, General."—*The Ohio State Journal.*

paid by the profits. Forty young partners were thus given a direct interest in the business, and others were added from year to year. The possibility of acquiring a fortune was an inspiration to these young men. Their interest was aroused. Their zeal kept them 'in excellent training,' to the great advantage of the business.

"The profit-sharing was not confined to the 'office men.' It was justly extended to the mechanical men—superintendents and foremen—until every manager of a mill possessed an interest in the business, and none of the important committees was without a mechanical representative. The speaker said that the principal element of the success of the Carnegie Company was the selection of many partners from among its most capable employes. But the masses of the ordinary workmen were not admitted to partnership in the Carnegie Company for the reason that the risk to savings in manufacturing was regarded as too dangerous for wage earners. The company, therefore, advised and encouraged the workingmen to invest their savings in homes, and the company advanced funds for home building to employes who possessed unincumbered titles to land. Savings were received by the company and kept in a special trust fund, at interest, to facilitate home building."

The Gambling Mania.

REPORTS from various parts of the United States indicate an alarming growth of the mania for gambling. In some cities it has taken the form of excessive card playing by society and club women, in others it has shown itself in stock speculation or race-track betting among the young men and even the boys.

The Index, a leading society paper of Pittsburg, has revealed the effects of euchre-playing upon the women of that city as follows:

"No amusement indulged in by the society people—especially the women—of this city has ever so served to debase and damage the moral sense as euchre-playing. It is bad enough that it should occupy the time and thought of such a great number of the feminine portion of society, to the total exclusion of immeasurably

better things; it is accusation enough against it that it usurps the brain so completely that things really worth while—art, literature, charity, and wholesome Christian living—have been forgotten; it is stigma enough upon it to say that it empties sense out of good heads and dumps in trash; but what shall the verdict be when it is proven that the game of euchre as played today in Pittsburg is making greedy, rude, and even dishonest women?"

MISS DEMOCRACY:—"What! Are you coming back?"
—Mr. Bryan's *Commoner*.

The Index further declared there were "hundreds of euchre clubs in the city holding weekly, or more frequent, meetings; that the most of these hold afternoon sessions attended solely by women; that expensive prizes are played for, and that all the evils of gambling have developed."

In Chicago the desire to get rich quick has been perhaps the chief factor that has led thousands of young employes into the gambling habit. Speaking of the prevalence of the evil among this class, the Chicago Tribune says:

"When the employes of business houses, clerks, bookkeepers, managers, or agents, having confidential relations with the house in some cases, gamble because of their mania to get rich quick they may harm others as well as themselves. They have no intention at the outset of being dishonest. It is the desire to make a large sum out of the small amount on hand that induces the first step. Nine times out of ten the next stage is debt. Then comes embezzlement to get even and try again, with the intention, of course, of returning the amount, but in most cases the victim only gets in deeper and deeper, and the last stage is ruin."

The Loss of Personal Religion.

CAPTAIN ALFRED T. MAHAN of the United States Navy, who is one of the greatest naval authorities living, recently delivered an address before the Church Club of New York, which has aroused widespread comment. His subject was "Personal Religion." Captain Mahan declared that the present generation has forgotten the first commandment and is finding its religion in philanthropy. He protests vigorously against this, and declares the present standstill condition of the church is due to this serious mistake. He said:

"In my judgment, the church of today, laity and clergy, have made the capital mistake in generalship of reversing the two great commandments of the law; the two fundamental principles of her war, established by Christ Himself. Practically, as I observe, the laity hold, and the clergy teach, that the first and great commandment is 'Thou shalt love thy neighbor as thyself.' Incidentally thereto, it is admitted, 'Thou shouldest love the Lord thy God.' It is, of course, too egregious an absurdity openly to call that the second commandment. It is simply quietly relegated to a secondary place.

"You may perhaps dispute this deduction as a matter of fact, or may remind me of St. John's words, 'He who loveth not his brother whom he hath seen, cannot love God whom he hath not seen.' It is evident, however, on reflection, that St. John is in no sense inverting our Lord's order. He simply appeals to evidence. This man says that he loves God. Very well, where is the proof of it? Does he love his brother? If not, he certainly does not love God, for the love of the brethren is the sure, inevitable fruit of loving God. In fact, the whole missionary spirit, and much that is not narrowly missionary, involves love for brethren whom we have no more seen than we have seen God. The love of God is the one sure motive and source of the love for man.

"Is not the judgment of the world expressed, and is it not a true judgment, in the words of indifferent contempt for a man who is trying to save his own soul—his miserable soul, as I have sometimes read? And yet what is a man's soul? It is the one thing inexpressibly dear to God, for which, if there had been but one, He was content to give His Son, and this He has intrusted to the man as his own particular charge; I do not say his only charge, but the one clearly and solely committed to him to make the most of. It is the talent which he is to multiply by diligent care; not that he may delight in it himself, but that he may present it to God through Jesus Christ. * * * Because care of one's own soul, by internal effort and discipline, seemed selfish, men have rushed to the extreme of finding in external action, in organized benevolence, in philanthropic effort, in the love of the neighbor—and particularly of the neighbor's body, for the neighbor's soul was naturally of no more account than one's own—not merely the fruit of Christian life, but the Christian life itself. That the kingdom of God is within you, an individual matter primarily and in essence, and only in consequence, and incidentally external, as all activity is but a manifestation of life, and not life itself—all this was forgotten. This I conceive to be the state of the church now. I mean as an organization; for I doubt not the multitudes of earnest cultivators of their own souls for the glory of God—perfecting holiness, as St. Paul says, in the fear of the Lord."

The War Against Alcohol.

THERE are signs that the fight against alcohol is increasing in magnitude and intensity all over the globe. The civilized nations are combining to keep alcoholic drinks from the savage and barbarian races in the Pacific Ocean. In France the government itself is conducting a vigorous crusade against the evil which is undermining the nation. In England the most stringent liquor law ever enacted, short of actual prohibition, has recently been put into force; while in this country a great campaign of education is being waged, which is training up multitudes of the rising generation to shun alcohol as they would some deadly disease.

UNCLE SAM:—"That century plant was worth buying."
—*The Philadelphia Press.*

ELECTED WITHOUT A PARTY

THE re-election of Samuel M. Jones, the "Golden Rule" mayor of Toledo, by a big majority has been generally recognized as an event of importance. It is important, for it marks one of the first movements of a public official to get away from the slavish control of a party organization. His campaign was conducted without the support of a party or a personal machine and in the face of an agreement among the newspapers of the city not even to mention his name except when absolutely necessary. He publicly announced his candidacy for the fourth time from the steps of the government building to a large crowd. Some of his auditors cheered him; some hissed him, and some were—or at least affected to be—stolidly indifferent. The crowds in the streets sang, led by the mayor, "My Country, 'Tis of Thee," while his son, Paul Jones, played a saxophone accompaniment.

Every noon and every evening during his campaign the mayor made speeches either on the street corners, at the gate of some manufacturing establishment, or in some hall in the outlying or manufacturing districts.

Pitted against him were John W. Dowd, perhaps the best educated man in Toledo, a rattling campaigner and a good fellow, as the Republican nominee of an old-fashioned delegate convention, and Charles M. Edson, cashier of the Dollar Savings Bank, the Democratic nominee, nominated, also, in a delegate convention.

When Mayor Jones announced his candidacy for the fourth term not a newspaper in the city would print his proclamation as a matter of news, and only one, a Democratic daily, would accept it as advertising matter, and the others refused to print it, even though paid at double rates, unless it should be scheduled as advertising. At that some of the papers refused.

He lives about a mile from his office. It is nothing unusual to see him start on a dead run from home, down through the crowded streets, and make the full mile on the keen gallop. To those unacquainted with his eccentricities, such a sight is perhaps more amusing than inspiring. He also prides himself on his ability as a high kicker. On the day of the city Republican convention, he amused a number of guests in the Boody House, by showing that he could kick the hat off the head of a six-foot man standing beside him.

Mayor Jones was first nominated by the Republicans as a compromise candidate in a very bitterly contested convention. He soon gave evidence that he was not much of a Republican in a good many respects. In the next convention he was defeated by two votes and some clever political work in the delegations.

Mounting the platform he said he refused to accept the dictates of the convention, and he would stand alone and try for the election on his merits as a non-partisan candidate. In the election that followed he was elected by an overwhelming vote.

The next time the Democrats let their nomination go by default—named no candidate. The Republicans nominated Gen. W. V. McMaken, one of the most popular men in the city. Jones was elected by over 2,000 majority. This last time a most determined effort was made to defeat him. It was the battle of his life, yet he was smilingly confident and won.

BECOMES COLLEGE PRESIDENT AGAIN

THE choice of Professor John Huston Finley for President of the College of the City of New York, marks another step in the eventful career of this scholarly and talented young man. Many of the readers of OUR DAY will recall the sketch published several years ago under "Romances in Real Life," entitled "From Plowboy to College President." At that time he was President of Knox College, Illinois. From there almost directly he went to Princeton University, where he has since occupied the chair of politics. While at Princeton he adopted unconventional and effective methods for acquainting his students with the political methods of different countries, by organizing them into legislative bodies. Dr. Finley has also done considerable literary and editorial work. He will be expected to achieve lasting changes for good in the institution of which he is now the President-elect.

The College of the City of New York is a free college—a part of the public-school system. It is one of the three or four colleges in the United States that are under city control. The oldest of these is the picturesque College of Charleston, S. C., which dates from the eighteenth century. The College of the City of New York is, on the other hand, we believe, actually the youngest, having been founded as a high school in 1847 and having been made a college as late as 1866. But its value to the city has been very great; it has done much to democratize higher education, and, like the system of which it is a part, has aimed to make the instruction which it has furnished practical rather than merely academic. Next fall the corner-stone of the first new building on its new site, on the heights uptown, will be laid, and at the same time the new President will be installed.

MISS GOULD'S PRACTICAL PHILANTHROPY

MISS HELEN MILLER GOULD has set an example to the exclusive rich of America by her determination that no part of her estate shall remain idle and useless to the public. Workmen are now making ready several buildings on the grounds which have not at present any special use, so that they may be the homes of Miss Gould's philanthropic projects. Improvements on a stone building, which is to be used for a cooking school for the girls of Irvington and Tarrytown, are almost completed, and within a very short time everything will be in readiness for the school to open. Besides the cooking school, Miss Gould has fitted up another building for a sewing school. Here, too, the girls of Irvington and Tarrytown will be the students.

Dr. W. H. Tolman, the social economist, is to spend all this coming summer in Europe at Miss Gould's expense getting suggestions of all kinds which will be useful to Americans in regard to model tenements, care of employes and other subjects of general interest and helpfulness.

DR. TORREY'S BUSY DAYS

THE world has been scanning the horizon in every direction for the coming Moody. They have not found him, but they have discovered in Dr. Torrey, the head of Moody Bible Institute, a man whose labors in a remarkable round-the-world evangelistic tour have been signally blessed. He is now closing his magnificent campaign in the British Isles with a month's meetings at Belfast, and will return to this country the middle of next month. April he spent at Aberdeen as he had spent March at Glasgow and February at Edinburgh, and from each place he came away amidst loud calls for a speedy revisit. There were 1,500 conversions at Edinburgh and similar ingatherings at the other points. On the whole, counting the 10,000 at Melbourne, and the large numbers in Tasmania, New Zealand, India, China, Japan, Great Britain and Ireland it appears quite within limits to say that Dr. Torrey's tour has been instrumental in winning 20,000 souls for the kingdom.

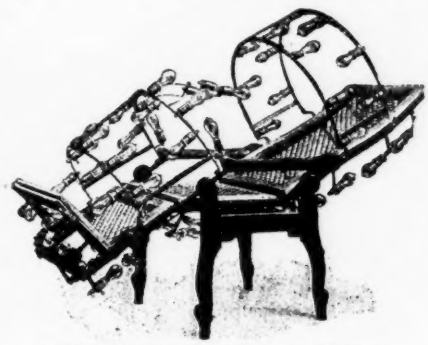
The British confidence in the evangelist has grown so strong that practically the whole evangelical influence of the islands has converged on demanding his return next year, and he has consented to recross the ocean in the late summer. September will be devoted to meetings in Liverpool; for October Dr. Torrey will go to Dundee; November and December will be given to Manchester. After the new year he will go to London for an extended work in a great tabernacle now being constructed for the purpose, and then Glasgow will claim him for about three months. Meanwhile, with this taxing winter to look forward to, Dr. Torrey will secure little rest in the approaching summer. Superintendent Fitt, of the Moody Bible Institute, has arranged to celebrate his arrival again at home with a great convention of Christian workers to be held at the institute in Chicago June 23 to 30. On the evening of the opening day a mighty evangelistic rally will be held in the Chicago Auditorium, at which time Dr. Torrey will relate the story of his wonderful experiences abroad.

DR. CUYLER'S CONUNDRUM

THE Rev. Theodore L. Cuyler was a guest at the dinner of the Monroe Society last year and pronounced the following conundrum: "Why was Noah the greatest financier of his time?" As no one could answer, he gave the diners a year to think it over. Being prevented from attending the dinner this year, he telegraphed the answer to his query of the previous year. "Noah was able to float a stock company at a time when all his contemporaries were forced into involuntary liquidation."

ELECTRIC LIGHT BATHS

THE value of electric light baths in the treatment of diseases has been fully recognized. But thus far their use has been restricted to a small number of patients, owing to defects in the construction of apparatus. Patients suffering from stiffness in the joints or from a mis-curvation of the knee-joint, as well as those afflicted with heart trouble or nervousness, could not endure the contrivances that have been in use when the patient would have to sit



DIRECTOR PASCHEN'S LIGHT-BATH RECLINING CHAIR.

up or recline to receive treatment. Director Paschen's portable light-bath reclining chair, shown in the illustration, corrects these defects. It is destined to fill a long-felt want in electro-therapeutics, for it enables even the most timid and sensitive patient to derive the benefits of these salutary baths. Director Paschen is an orthoepist in Dessan-Anhalt, where he has a sanatorium.

SCIENCE DISCOVERS SMALLPOX GERM

DR. WILLIAM T. COUNCILMAN, professor of pathology in the Harvard Medical School, announces the discovery of the cause of smallpox. The cause has been determined to be the protozoa, the lowest form of animal life.

The honor of making this discovery is divided. Dr. Councilman, who made the formal announcement, gave out the following statement:

"This announcement is the outcome of an investigation conducted by Drs. Councilman, George Burgess Magrath, and Walter Remsen Brinckerhoff, with the cooperation of the Boston board of health, during the recent epidemic of the disease in that city. It has been determined that smallpox is caused by a micro-organism representative of the lowest form of animal life. This fact serves to relate the disease with malaria, and to distinguish it from many other infectious diseases, caused by minute forms of vegetable life known as bacteria."

Dr. Councilman says that research in the field of bacteriology was first exhausted without finding the cause of the disease. Then, falling back on anatomy, the research was continued, and it was finally decided, after repeated experiments, that an organism, the protozoa, was the cause of the disease. A protozoa belongs to the animal kingdom, and so the field for further investigation is pathological rather than bacteriological.

Dr. John H. McCollom, instructor in contagious diseases at the Harvard Medical school and the head of the south department of the Boston city hospital, is most enthusiastic regarding the investigations of Dr. Councilman. Said he:

"Anyone will immediately see the great advantage of this, for with definite knowledge of the protozoa which causes smallpox it will be possible to diagnose the disease early. Suppose, when the suspected patient is examined it is possible for me to take a stain of his blood and by the microscope ascertain whether he has smallpox or not. Suppose, instead of waiting fourteen days for the eruptions to appear, I find the smallpox organism in the blood. Then I am able to say: 'This patient has smallpox; there is no doubt about it.' If it is possible to make the diagnosis early much valuable time is saved, and it gives us a great opportunity to obtain a cure."

NEW THEORY OF WEIGHT

PROF. STEPHEN M. BABCOCK, of the chair of agricultural chemistry at the University of Wisconsin, the inventor of the Babcock milk test, announces as a result of twenty years of research, a revolutionary theory of atomic energy. In brief, it is that the weight of any substance is affected by the molecular changes which it undergoes. As Prof. Babcock stated it, the law is, "The weight of a body is inversely proportioned to its inherent energy."

This practically overthrows the old atomic theory and the theory of conservatism of matter, and leads to the idea that all atoms are primarily identical and that the difference in weight of the elements is due to the difference in their energy. This theory, according to Prof. Babcock, would offer a satisfactory explanation of the law of gravitation.

A MOLECULE OF HYDROGEN

IT is something to say that one molecule of hydrogen contains a thousand corpuscles or electrons dancing about in it, but one fails to apprehend how small even the molecule of hydrogen is. We get a new idea of the multitude of these infinitesimal objects when we ask how many there are in what we call a vacuum. Take an ordinary glass bulb, five inches in diameter, such as is used in high vacua experiments, and when unexhausted it contains, says Sir William Crookes, more than 1,000,000,000,000,000,000,000,000 molecules. Now exhaust the bulb, so that only one-millionth of an atmosphere shall remain, which is as complete an exhaustion as we can make, and there will still be 1,000,000,000,000,000,000 left. Quite a plenty to produce the effects of radiant matter, X-rays, etc. So a "high vacuum" is a vacuum only by courtesy. Crookes believes that in an absolute vacuum radium would cease to show its peculiar properties.

VAST ENERGY RUNNING TO WASTE

IN one of Professor Hele-Shaw's Christmas lectures at the Royal Institution, dealing with the subject of "Locomotion: Fast, Present and Future," he showed how certain sources of power in nature were to a great extent untouched. The pictures he exhibited on the screen, illustrating the way in which the mighty Falls of Niagara had been harnessed to the service of man, were full of interest; and no doubt much surprise was excited at the statement that only one hundred thousand horse-power was at present utilized of the ten millions which were available. It would also be a revelation to many to learn that the Victoria Falls on the Zambesi were twice as high, and that the water which came over was twice the volume of that at Niagara. The lecturer gave the available horse-power of these falls as thirty-five millions—a vast amount of energy which was now, and had been for untold ages, running to waste. Some day these falls will be made to churn out vast volumes of electrical energy, enough to feed a network of railways which will cover a no longer "dark" continent. It was most interesting to be reminded by the lecturer that in that very theatre in which he was speaking the great Faraday showed the initial experiments upon which present methods of converting motion into electricity are based.

SCIENCE NOTES

Eight ordinary hen's eggs were submitted to pressure applied externally all over the surface of the shell, and the breaking pressures varied between 400 pounds and 675 pounds per square inch. With the stresses applied internally to twelve eggs, these gave way at pressures varying between 32 pounds and 65 pounds per square inch. The pressure required to crush the eggs varied between 40 pounds and 75 pounds. The average thickness of the shells was 13-1000 inch.

The most wonderful farm in the world is situated in Canada. Its peculiarity lies in the fact that everything is worked by electricity. Two waterfalls within the bounds of the farm, some 60ft. and 180ft. high, furnish the motive power, a central powerhouse being erected near, and the current is transmitted by wires to every available place on the farm. The churns and other necessary implements have electric motor attachments. A motor of ten horse-power works the mowing machine and another works a log saw; while the house, barns, and grounds of the farm are illuminated by electricity. The owner declares that he saves some $2,500 in labor annually.

Religion and Reform

STEPS TOWARD CHURCH UNION

ON April 22 and 23 forty-three men, representing four denominations, Congregationalists, United Brethren, Methodist Protestants and Christian Connection, met in Pittsburg to consider a formal consolidation into one body. According to the report of the meeting by Dr. William Hayes Ward, editor The New York Independent, who was present as a Congregationalist, they had a partial success, and it is well worth while to tell the story of it as an incentive to other attempts, for certainly the continued separate existence of some one hun'red and fifty denominations in this country, many of them closely allied, is no compliment to their common sense or their Christianity.

These four, in the order of their numerical strength, are the Congregationalists, with over 650,000 communicants; the United Brethren, with over 250,000; the Methodist Protestants, with 200,000, and the Christian Connection, with 100,000. No two of them have ever been in any close historical or geographical connection with each other. Where one denomination strongly prevails the others are weak. Accordingly they have lived apart without much mutual knowledge. Yet they have all felt the spirit of the times and the wrong, if not the evil, of schism. An attempt a dozen years ago to unite the Congregationalists and the Christian Connection was a failure, as had been a previous attempt to unite the Congregationalists and the Free Baptists. The Congregationalists and the Christian Connection have maintained a Committee on Church Union. There has been a good deal of correspondence for half a dozen years between the Congregationalists and the Methodist Protestants on union, but nothing done.

After much discussion at this conference the following paper was adopted:

"The Congregational, Methodist Protestant and United Brethren denominations represented in this meeting agree to recommend that a subcommittee shall be appointed by the General Committee to work out the preliminary details of a union looking to the ultimate and complete organization of these denominations in accordance with the following ideas:

"The formulated statements of doctrine, as held by each of these denominations at present, although phrased differently yet being essentially the same, are to be affirmed. The union for the present is to be expressed in the organization of a General Council, to be composed of representatives elected from the respective denominations composing the union on some ratio of membership; this Council to have its powers and duties defined, but all legislative and judicial matters shall be referred to the general bodies of the respective denominations. These denominations shall retain their present names and their autonomy in respect to all local affairs, but they shall add to their official title the following, 'In affiliation with the General Council of the United Churches.'"

This action leaves out the Christian Connection, at present, which could not accept the statement about creeds.

The sub-committees meet in Washington the 27th of this month for further discussion. While the three denominations could not immediately consummate a full union, there seemed to be no reason why the United Brethren and the Methodist Protestants could not. The desire was warmly expressed by all that they might. Accordingly, their committees met by themselves after the adjournment of the other bodies and came to a satisfactory agreement on all matters except their common name.

SMOKING BY BOYS IN SWITZERLAND

THE principals of state schools in the cantons of Vaud and Neuchatel, Switzerland, are drawing the attention of parents to the spread of smoking in the schools, and asking the parents' support in stamping out this pernicious habit, which has increased to an alarming extent within recent years.

The cheapness of Swiss tobacco is responsible for the increase of smoking among boys. Packets of Swiss cigarets containing ten are sold by retailers at about a penny a packet, young boys being the chief customers. At one school, numbering 242 boys, whose ages varied from 13 to 16 and a half years, 127 admitted smoking, while 31 others were evidently addicted to the habit.

RESULTS OF TEMPERANCE INSTRUCTION

AT the International Anti-Alcohol Congress recently held in Bremen, Germany, Mrs. Mary H. Hunt, on the request of its members, addressed them on the significance of scientific temperance instruction in public schools as a preventive of alcoholism. She said in part:

"The people of the United States secured between the years 1882-1902 the passage of state and national laws by which the study of physiology and hygiene, including special instruction as to the nature and effects of alcoholic drinks and other narcotics, became mandatory for all pupils in all schools of the republic.

"Temperance physiology has thus been very generally taught for ten or fifteen years, and it is significant that during this time the rate of increase in the per capita consumption of alcoholic liquors has diminished materially; also that there has been a gain of four and one-tenth years in the average length of life.

"Careful grading shows that the subject can be adequately covered by a minimum of three oral lessons per week for ten weeks in each primary year, and four textbook lessons per week for ten weeks in each of the five grammar years and the first year of the high school.

"Objection is sometimes made to scientific temperance instruction on the ground that by injuring the brewing traffic it will decrease the national revenue. Figures show, however, that every dollar of tax on fermented and distilled liquor paid into the national treasury costs thirty dollars in the cost of consequent crime and poverty. The same is doubtless true in other countries."

A NEW PROFESSION

A NEW profession has grown up because of the extension of Young Men's Christian Association work in this country, and the trained Y. M. C. A. secretary is now considered to be as important a personage as is the member of any of the older professions. The associations now employ 1,714 trained secretaries, physical, educational and religious work directors and boys' secretaries, and the demand for these trained men is every year far greater than the supply. The association has two training schools, one in Chicago and the other in Springfield, Mass., and each has a three years' course, the two schools graduating about twenty-five men annually. That this number is far too small is shown by the fact that last year the demand of the associations was for 347 trained men. Association leaders declare that it would be possible to double the number of associations in a very short time were the properly qualified men needed for secretaries and directors procurable. The training school at Chicago has about eighty students, and that at Springfield over ninety.

WORLD'S PRODUCTION OF BEER

ACCORDING to the Brewers' Gazette, a German technical journal, the output of the principal beer producing countries was as follows in the year 1901:

	Number of Breweries.	Production (hectoliters)
Germany	10,281	69,250,000
United States	2,412	67,750,000
Great Britain and Ireland	6,730	60,000,000
Austria-Hungary	1,526	21,500,000
Belgium	3,223	14,000,000
France	2,550	9,333,000
Russia	1,025	5,250,000

A hectoliter is 22 gallons.

In Germany the Kingdom of Bavaria exceeds by far the other States of that Empire in point of beer production and consumption. In many Bavarian families the principal item of expenditure is beer.

PROSPERITY UNDER NO LICENSE

VAN BUREN County, in Michigan, voted out the liquor traffic some twelve years ago. Since that time the question has been re-submitted to the people upon different occasions, and the decision against the saloon has always been sustained. A good deal of interesting information regarding the present position of the county is given by C. DeW. Brower, who writes:

"South Haven, the largest city, with a population of 4,500, and township with 1,000, has not a drunkard's family to support. In 1887, the last year of the saloon, the village and township, with only a third of the present population, paid $510 for the support of the poor. In 1902 it cost only $519. There is little pauperism in the county, real prosperity prevailing."

PRESIDENT ELIOT ON EDUCATION

AS president of the American Educational Association, President Charles W. Eliot, of Harvard, has written quite a remarkable book urging "More Money for the Public Schools." President Eliot took occasion in the course of his study of the subject to cover practically the whole range of educational topics, and many of his conclusions are so valuable they deserve careful attention, as will be seen in the extracts which follow:

* * *

For millions of American children systematic education stops far too soon; and for millions of adults the mode of earning the livelihood affords so little mental training, and becomes so automatic, that mental growth is seriously hindered, if not arrested. I find here a strong argument for the expenditure of more public money on the education of the children, that they may be held longer in the schools with greater profit and greater enjoyment, and, therefore, have a better chance for continuous growth afterward; and, secondly, I find in these considerations a strong argument for a moderate number of hours of daily labor in those occupations which have little variety and call for little exercise of an intelligent judgment.

* * *

The true aims in a primary school are to store the mind with fair pictures, implant ideals, cultivate the habit of intense, though brief attention, and train the sense of justice.

* * *

The cost of urban public school systems has been materially increased during the last twenty years by the institution of four new kinds of school—the manual training school, the mechanic arts high school, the evening school and the vacation school. All these branches of the public school organization were introduced into our country by private beneficence, and have only gradually been adopted into public school systems. The manual training school, the mechanic arts high school and the vacation school are undoubtedly permanent institutions of public education. Evening schools may or may not prove permanent. At present they remedy deficiences of education in young people who are of foreign birth or who have too early gone to work to support themselves or their parents. If public education were universal and thoroughly effective the evening school would not be so much needed. Its duration as an institution will therefore depend on the rate at which public school systems improve in efficiency. All these new branches of public instruction are somewhat expensive additions to the ordinary day schools—the mechanic arts high school being particularly expensive, as well as very useful. The utility of manual training for city children has been thoroughly demonstrated, and there can be no doubt that this somewhat costly form of instruction will be maintained and developed.

* * *

Within twenty years there has been an increasing employment of educational experts in the supervising and executive functions of urban school systems. The former method of entrusting executive functions to small sub-committees of a large school committee is passing away; and we may reasonably hope that this method will soon be extinct.

* * *

The remarkable increase which has taken place within the past fifteen years in the proportion of American children who attend secondary schools is a great educational gain for the whole country. The causes of this sudden increase are probably numerous, and different in different communities; at any rate, they are complex, and one cannot feel sure what they are. Probably parents realize more and more that the more prolonged the education of a child, the better his or her chance will be in the competition to which every newcomer is exposed in the world of industry and commerce. It is true that the attendance at the high school diminishes too rapidly in the successive years of the course; but every year gained by the pupil is well worth having. Indeed, there are competent observers who think it would be wise to blur as much as possible the line between the grammar schools and the high school by carrying studies now confined to the high school down into the grammar school, and postponing as much as possible the segregation of the more advanced pupils in a separate building. By these changes the grammar-school course could be much improved; and a larger body of pupils could be held under instruction after their fourteenth or fifteenth year. Another suggestion looking to the same end is the six-years' high-school course.

* * *

The greatest educational success of the last thirty years is the complete adoption of the elective system in a few institutions, and its partial and progressive introduction in almost all. Yet the elective system is indefinitely more costly than the prescribed. It should be remembered that it is a system, and not an unorganized chaos, or a distracting bazaar; it has made real scholarship possible to thousands of young Americans by the time they are twenty-two years of age; it has raised very much the standard of labor for both teachers and taught in our colleges and universities; and it has made it possible for thousands of American students to win that delight in study which accompanies the sense of mastery or of clear achievement. It has also improved immeasurably the relations between professors and students, mollified college discipline, and greatly ameliorated the manners and customs of college students. And yet it has by no means wrought out all the good it can do; but it is firmly established throughout the country, and thus far it has followed in other institutions the same stages of development that it followed at Harvard.

* * *

In no department of education has greater improvement been made during the past generation than in professional education. The whole provision for training young men for the new scientific professions has been created in this country during the last fifty years; and America's success in the scientific industries is evidence that the new schools of science and technology have done good work. It is to be remarked that an important part of the training for the scientific professions is laboratory work—the most expensive form of teaching now known; for it is teaching addressed to the individual student by experts. The changes, however, in education for the old professions of divinity, law, and medicine are quite as striking as the new creations for applied science. If I were asked to say in what department of Harvard University the educational change had been greatest since 1870, I should answer the Medical School. There, and in many other medical schools of the United States, the whole method of instruction has been changed root and branch; and the raw material of the school—the incoming student—has changed to an extraordinary degree within the same period. In 1870 anybody, no matter how ignorant, could enter any medical school in the country. At the Harvard Medical School the examination for graduation was limited to five minutes in each of nine subjects; and to get a degree it was only necessary to pass the examination in five subjects out of nine. The past Academic year the Harvard Medical School required a degree in arts or science for admission to the School, and for many years past every graduate has been required to pass a thorough examination in every subject of instruction embraced in his course before he could receive his diploma. Nine-tenths of the instruction now given in a good medical school is given to individuals by highly trained and very skilful special instructors. These comprehensive and costly improvements in medical education have commanded general approval; and the schools which have effected them have been supported by the sentiment of the medical profession and encouraged by liberal endowment.

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TO INSTRUCT COUNTRY DOCTORS

THE country medical practitioner in Germany is to have an opportunity to learn the latest developments in surgery and general medicine from a traveling university that will bring post-graduate instruction to the nearest large town in his vicinity free of charge.

Emperor William has given his signature to the plans for this work, which will be paid for by the Government and by small contributions from medical societies.

Great specialists, such as Professors Lassar, Bergmann and Rumpf, will charge small fees for their services. Professor Lassar already has contributed 1,000 specimens of skin diseases to the museum, which will be carried from place to place with laboratory appliances.

The country doctor can thus come to his neighboring city for a week or two once a year and hear the leaders of his profession explain the latest processes for treatment or see celebrated surgeons operate. The idea of the traveling univeristy appears to have originated with the late Empress Frederick, who used to talk to Professor Renvers about it. The Bavarian Government already has made a limited use of the suggestion.

HYGIENIC HOUSE-CLEANING

THE Chicago Health Department has been urging the "hygenic housewife" to adopt the "vacuum method" in cleaning carpets, chair covers, tapestries and walls. The London Lancet approves this system and describes it in these words:

"Instead of the old-fashioned, dust-raising broom, the dust-scattering feather duster, or the more modern compressed air method, all dust and the disease germs which it contains are 'sucked' out of carpets, rugs, curtains, tapestries, etc., and conveyed through rubber tubes to anexhaust cylinder, whence it is emptied into the furnace for complete destruction.

"The process is simple enough. When spring cleaning is to be done a machine is sent to the house provided with a pair of vacuum pumps, operated by a motor, which serve to maintain an exhaust of several pounds to the square inch. Hose is connected with this exhaust, and terminates in so-called cleaners, which are tubes flattened at the end with a long slit. The cleaners are rubbed back and forth over the carpets, chair coverings, etc., and all the dust is quickly sucked out. It is removed not only from the surface, but from the body of the carpet."

The Chicago department urges that "sick rooms" be cleaned in this manner, saying: "Consumption, pneumonia, influenza, scarlet fever and similar diseases are known to be spread by infected dust of the sick room, so the distinct and recognized purpose of the operation shall be to remove and not simply to stir up the ever-gathering dust."

ELECTRICITY PURIFIES WATER

ELECTRICITY is being utilized in Germany for the purification of drinking water, according to a report made by Consul General Guenther, from Frankfort. He says:

"The City of Wiesbaden, Germany, has constructed extensive ozone water works at Schierstein for the purpose of obtaining a drinking water entirely free from pathogenic germs. The works are capable of rendering 250 cubic meters an hour at a cost of 2 pfennings (a little less than half a cent) a cubic meter. The ozone, generated by electric discharges in an apparatus composed of metal tubes, passes upward through coarse gravel contained in towers, while the water to be sterilized flows down and arrives at the bottom perfectly germless."

EYE STRAIN AND DYSPEPSIA

DR. GEORGE M. GOULD, of New York City, advances a theory in his recently published book that eye strain is largely responsible for dyspepsia. "The reflex result of eye strain," says Dr. Gould, "must be shunted everywhere except back to the eye itself. In women it goes to the head, and the world is full of those tortured with nervous or bilious headaches. In many, especially in men working much with their eyes, the reflex is to the digestional organs, with indigestion and liver derangements, anorexia, etc., as the result. The truth that eye strain induces these functional, gastric, intestinal and biliary disorders cannot much longer be ignored. When acted upon it will constitute one of the greatest advances in practical medicine that has ever been made."

Notable Utterances

GOD'S HAND IN AMERICAN HISTORY

EX-PRESIDENT CLEVELAND, at the dedication of the Louisiana Purchase Exposition in St. Louis, told the story of the purchase from Napoleon and drew a lesson from it at once profound and significant. His words should be preserved and read by every child in the public schools of the United States and by older heads as well, who need to have their memories refreshed. He said:

"In the midst of our rejoicing today it is peculiarly fitting that we recall with soberness and meekness some of the happenings in connection with the great event we celebrate, which impressively illustrate the interposition of Divine Providence in our behalf. We sought from a nation ruled by one whose ambition was boundless and whose scheme for aggrandizement knew neither the obligations of public morality nor the restraints of good faith the free navigation of the Mississippi River and such insignificant territory as would make such navigation useful. While our efforts toward the accomplishment of this slight result languished and were fast assuming a hopeless condition, the autocrat of France suddenly commanded one of his ministers to enter into negotiations with our waiting and spirited representatives, and exclaimed:

"'I renounce Louisiana. It is not only New Orleans I cede. It is the whole colony without reserve.'

"It was only nineteen days thereafter that the treaty transferring to us the magnificent domain comprised within the Louisiana purchase was concluded.

"This astonishing change in our prospects, which dissipated the fears and apprehensions of our government and revived the promise of our perpetuity and happy destiny, came at the moment that Bonaparte was organizing a force to occupy the Louisiana territory in the prosecution of colonial occupation and development, which, if consummated, would probably have closed the door even to the slight acquisition which we originally sought.

"The French colony of San Domingo was, however, a prime factor in this scheme of occupation, and it was essential to its success that this colony and Louisiana should both be included and should supplement each other. A serious revolt then raging in San Domingo delaying proceedings, the occupation of Louisiana was postponed until this revolt should be overcome. The troops sent from France to accomplish this apparently easy task were so stubbornly resisted by hundreds of thousands of freed blacks fighting against their re-enslavement, and they suffered so terribly from climatic conditions and deadly fever that after the sacrifice of 25,000 soldiers, many of whom were intended for the subsequent occupation of Louisiana, Bonaparte's plan for the occupation of both colonies miscarried. This disappointment, and the conception of new schemes of war and conquest by the restless dictator of France, and his need of money to carry out these schemes, were controling circumstances in leading him to throw in our lap the entire Louisiana territory.

"None of these circumstances was within our procurement or knowledge; but who shall say that God was not accomplishing His designs in our behalf amid the turmoil and distressing scenes of San Domingo's revolt? And how can it be said that there was no Providence in the unexpected, unyielding, and successful fight for continued freedom on the part of the negroes of San Domingo, or in the fatal pestilence that vied with bloody warfare in the destruction of the army of subjugation, or in the fever of war and aggression which heated the blood of Bonaparte, all combining to turn him away from the occupation of the Louisiana territory?

"Thus we may recall in these surroundings the wonderful measure of prophecy's fulfillment within the span of a short century, the spirit, the patriotism, and the civic virtue of Americans who lived a hundred years ago, and God's overruling of the wrath of man and His devious ways, for the blessing of our nation."

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Pike's Toothache Drops Cure in One Minute.

SCHOOL GARDENS FOR COUNTRY SCHOOLS

THE Farmers' Institutes in Illinois are agitating the question of making the teaching of agriculture compulsory in the district schools, requiring teachers to pass an examination on that subject and teach it in the daily work of the schools. O. J. Kern, the County Superintendent at Rockford, says of the movement:

"If the elementary instruction in agriculture is to be of any value, the children must do some practical work instead of committing a few pages of some dry book on agriculture. A school garden under the direction of an earnest, enthusiastic teacher, will afford an excellent field for training children in experimental and observation work. The future farmer who expects to make five per cent clear profit on an investment of land costing $125 per acre, will have to do some thinking. And the place for this thinking to begin is in the district school.

"Our higher institutions of agricultural instruction are discovering much that will be of great value to the future farmer. The problem is how to make this expert knowledge available for the country child. The school experimental garden promises much if teachers and directors will co-operate with the children.

"Last fall when visiting one of our district schools, I measured a plot of ground 12 feet by 36 feet. This seems a small area. But don't discourage the children at the outset. Many schools have only six or eight pupils and it is better to have a plot of ground five feet square well taken care of than one-fourth of an acre mostly grown to weeds. This may be enlarged for large schools. The dimensions give opportunity for number work with 12 as the unit."

There is no reason why a teacher might not at least encourage the pupils to take enough pride in their school to start a lawn, plant a few trees in front and enclose it with a neat fence. Nothing in a community is usually so bare and forbidding as the average country school yard. A few climbing vines, some grass seed, flower seeds and some trees and shubbery, any or all of which pupils might obtain at their homes, with the hard work done by their elders, would transform a barren waste into a bower of beauty. There would generally be found plenty of playground outside of the little plat reserved for this purpose. Enthusiasm is all that is needed.

HYPNOTISM IN DENTISTRY

DR. HARRY EASTMAN, a dentist of Wilmington, Ohio, is reported by "Medical Talk" as having had some remarkable experiences with two patients put in a hypnotic sleep. E. E. Dawson, the hypnotist, writes thus:

"The first, a young lady, after being placed in the hypnotic state and the proper suggestions given, the tooth, a second molar, was drawn without the slightest pain to the patient. After I had awakened her she knew nothing of the operation and wouldn't believe the tooth had been drawn until she made an examination for herself. About two weeks later she visited the same dentist and had two fillings put in. The drilling out and fillings were made while she was in the hypnotic sleep. One feature of this case deserves special mention, and that was the absence of saliva during the entire operation. It is well known by dentists that pain causes a much greater flow of this fluid.

"The second case was a lady, and the operation without any anaesthetic would have been very painful, as the tooth, a first molar, was cracked the full length and the gum grown in, so that it was impossible to remove the tooth without tearing it. The sleep was induced as in the first case, and the tooth removed in two pieces without the patient's knowledge. She di'n't make a sound or move a muscle that indicated that she experienced any pain whatever. In both cases the gums healed nicely and quickly. These operations were witnessed by several physicians and dentists and pronounced a success by them in every particular."

TRUCK FARMING IN THE SOUTH

TRUCK farming in the South has reached such proportions that there are today 150,000 farmers engaged in it. Nearly 267,000 acres every year are made into gardens. The State of Virginia alone contains 55,000 acres; North Carolina, 32,000; South Carolina, 20,000; Georgia, 43,000, and Florida, 23,000. Including the State of Delaware this strip of coast country produces vegetables annually to the value of about $15,000,000, nearly one-fourth of the total value of garden truck raised in the United States. The Virginia farmers receive about $3,000,000; those in North Carolina, nearly $2,000,000; South Carolina, $1,250,000; Georgia, $1,750,000, and Florida about the same. One-fifth of the vegetable farms, as they are called, in America, are located in this portion of the country.

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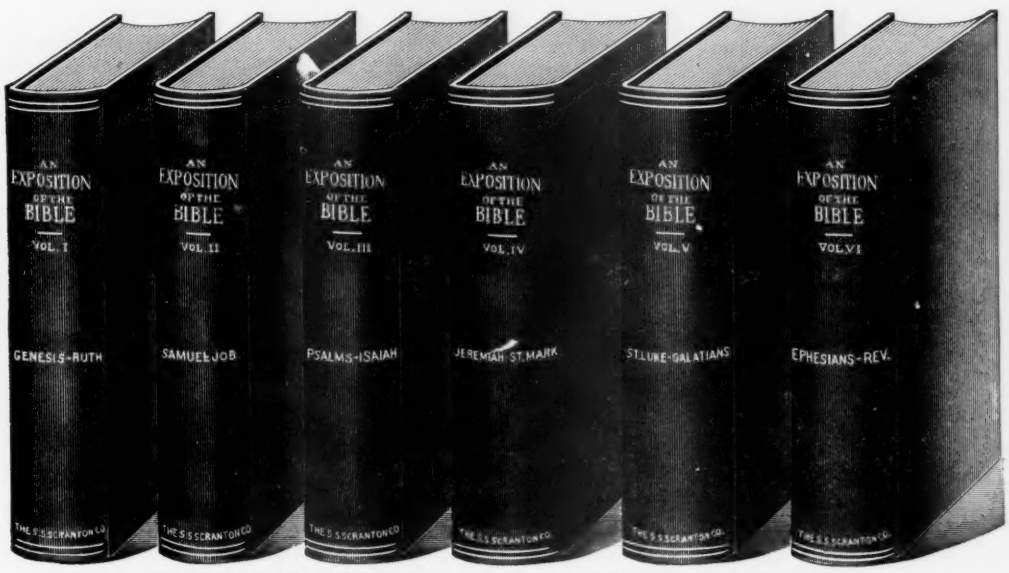

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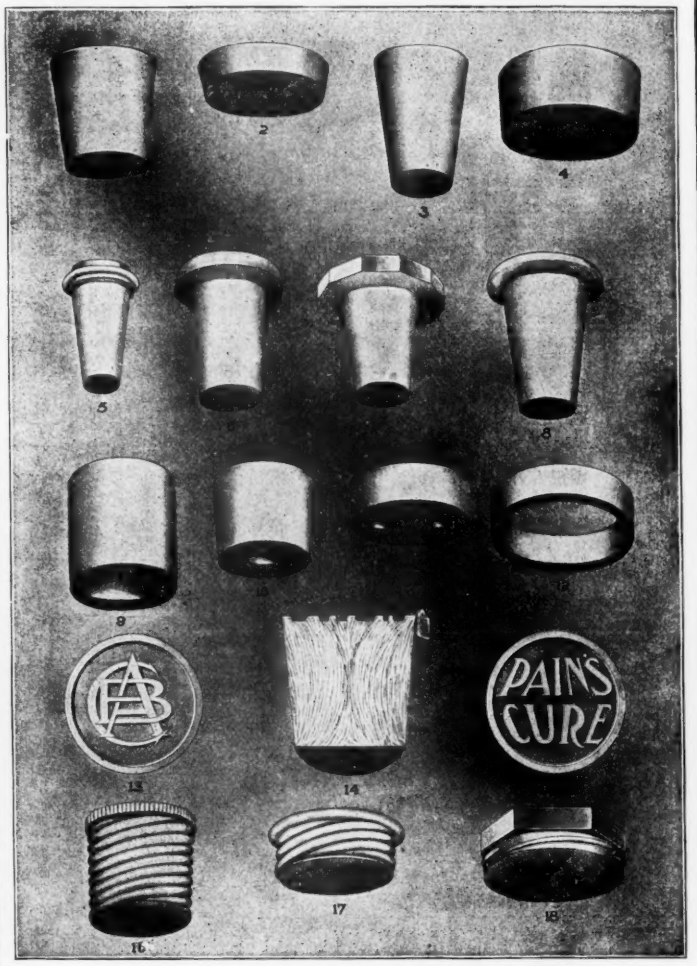

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